The NATIONAL GEOGRAPHIC MAGAZINE

Vol. XV JANUARY, 1904 No. 1

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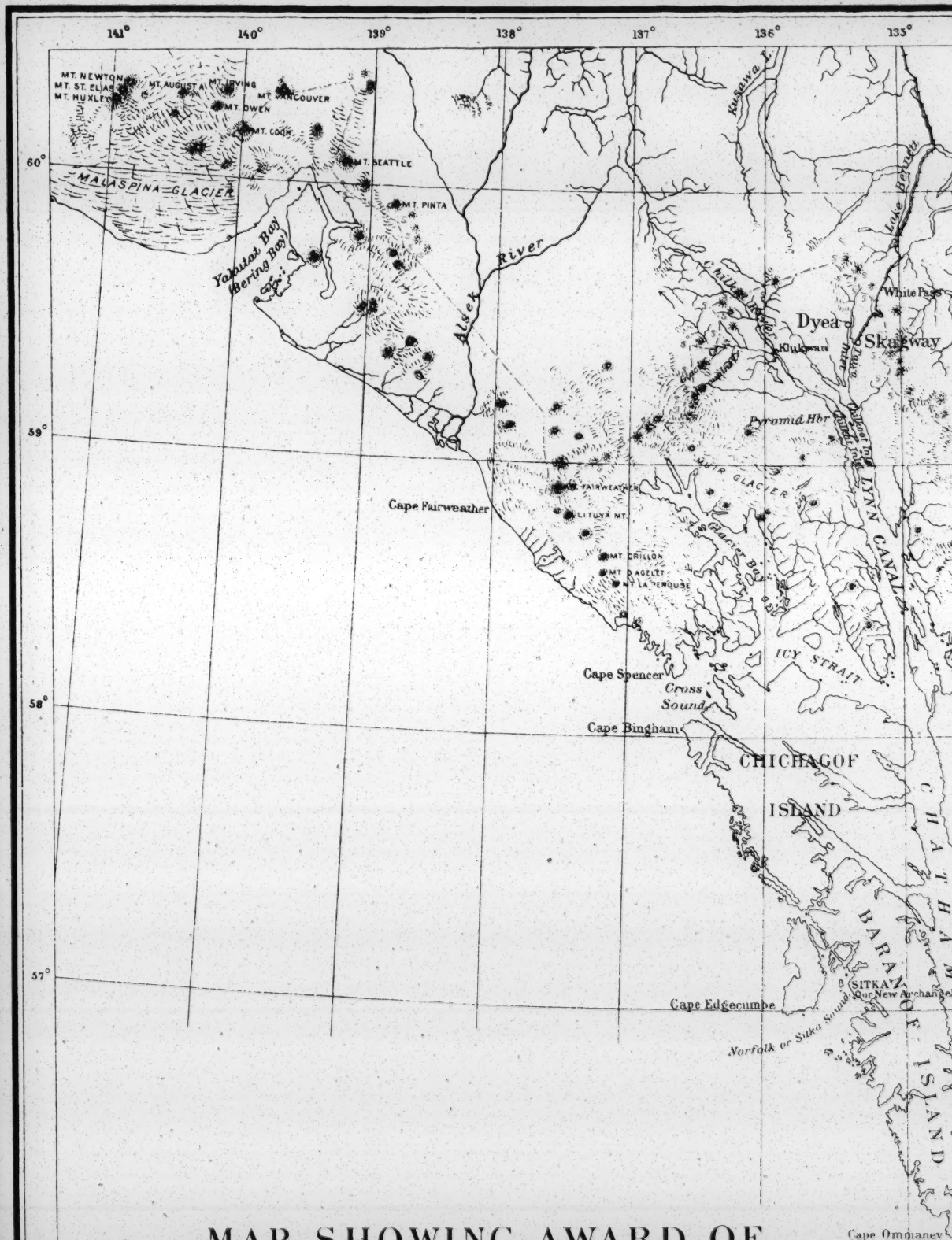

MAP SHOWING AWARD OF ALASKA BOUNDARY TRIBUNAL

134°
133°
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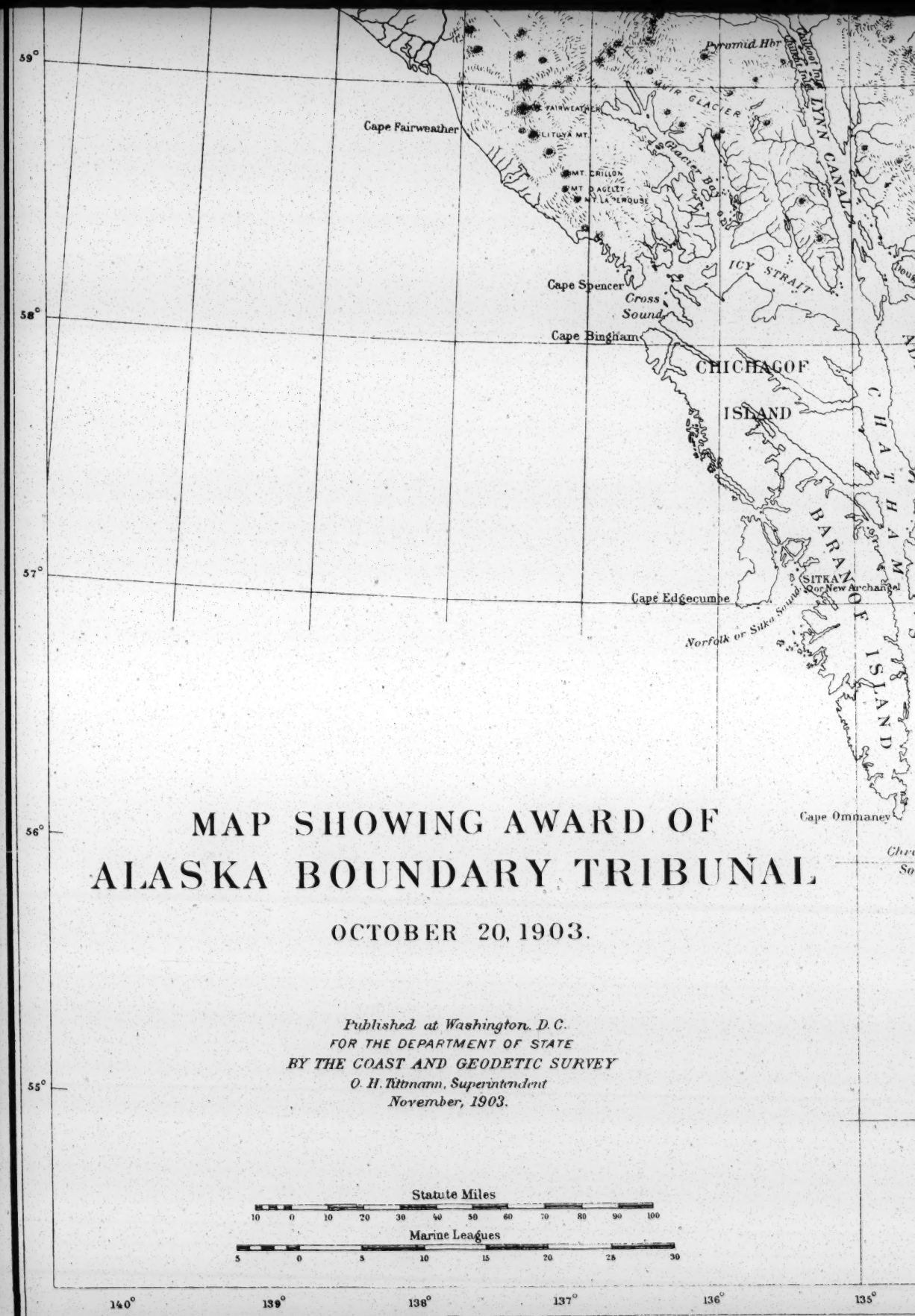
56°
Teslin Lake
Hyard River
Dease River
Inklin River
Taku River
Tuya River
Stikine River
Iskoot River
Juneau
Douglas
Stephens Passage
ADMIRALTY
FREDERICK SOUND
CHATHAM STRAIT
KUPREANOF ISLAND
KUIU ISLAND
Mitkof I.
Wrangell
Wrangell I.
Zarembo I.
Duke of York I.
Etolin I.
Sumner Strait
PRINCE
Christian Sound



MAP SHOWING AWARD OF ALASKA BOUNDARY TRIBUNAL

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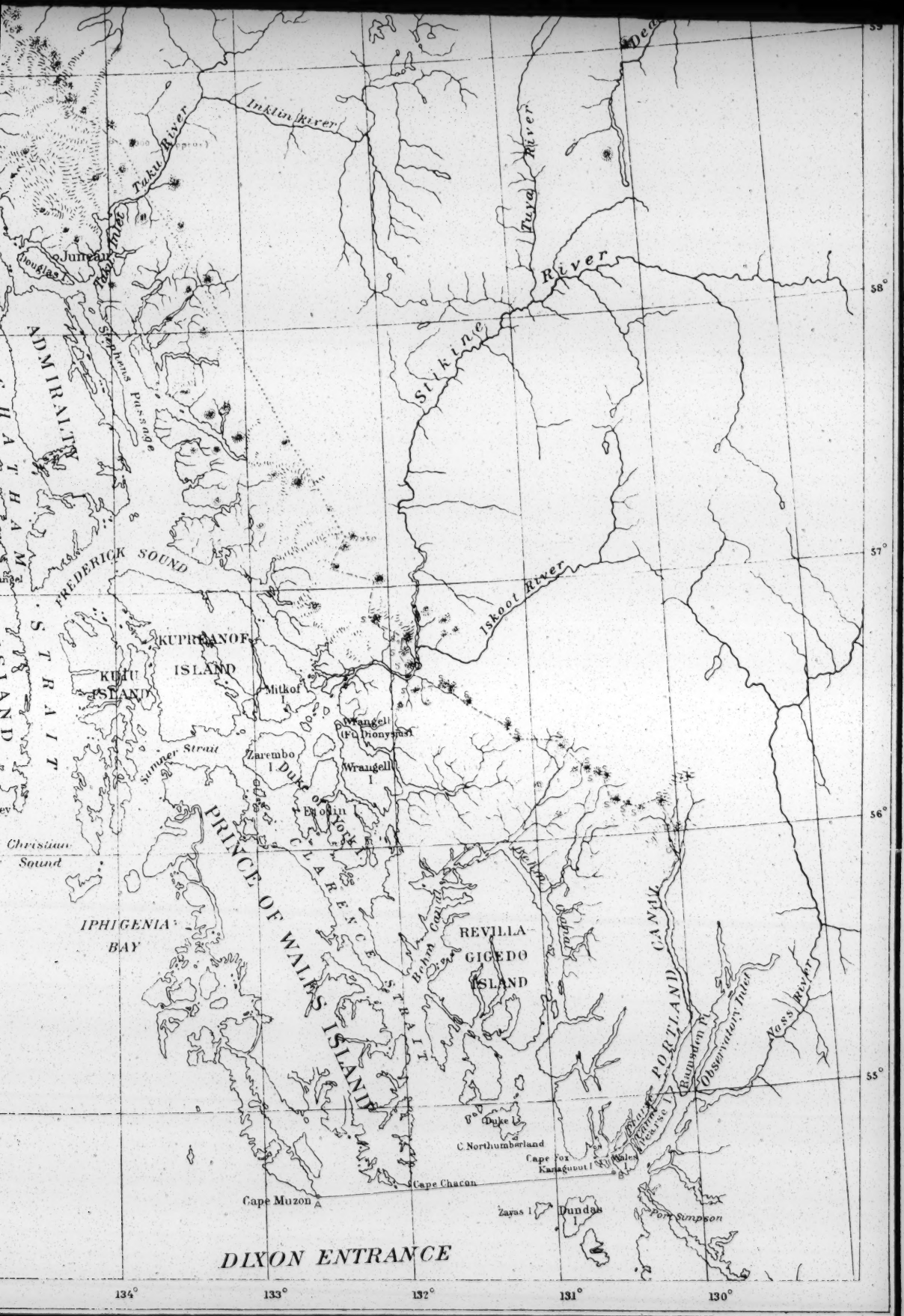
Taku River
Inklin River
Tuya River
Juneau
Douglas
Taku Inlet
Stephens Passage
ADMIRALTY
ISLAND
Slikine River
FREDERICK SOUND
KUPREANOF
ISLAND
KUIU
ISLAND
Mitkof I.
Wrangell
(Fl. Dionysius)
Wrangell I.
Zarembo I.
Duke of York I.
Entrance I.
Summer Strait
Christian Sound
PRINCE OF WALES ISLAND
CLARENCE STRAIT
IPHIGENIA BAY
REVILLA GIGEDO ISLAND
Behm Canal
Iskoot River
PORTLAND CANAL
Observatory Inlet
Ness River
Duke I.
C. Northumberland
Cape Fox
Kanagunut
Wales I.
Cape Chacon
Cape Muzon
Zayas I.
Dundas I.
Port Simpson
DIXON ENTRANCE
55°
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134°
133°
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131°
130°

VOL. XV, No. 1 WASHINGTON JANUARY, 1904

THE NATIONAL GEOGRAPHIC MAGAZINE

THE ALASKAN BOUNDARY TRIBUNAL*

BY HON. JOHN W. FOSTER, LL. D.

THE Tribunal which was recently in session in London and which adjusted the irritating and dangerous controversy respecting the Alaskan boundary was an unique body. It was not an arbitration tribunal in the usual acceptation of that term, as there was no umpire or neutral judge. Its membership was composed of three persons nominated by each government, and as a decision to be effective required the concurrence of a majority of the court, it was necessary for the settlement of the controversy that at least one member should decide against the contention of his own government.

It was insisted by the opponents of the measure that it would prove a useless proceeding, as a majority decision could not be obtained. Its friends, however, felt that the question was of such a character as to offer a solution by sober-minded judges, before whom the facts should be presented in a judicial manner; and, even if unhappily there should be a failure to secure an effective decision, the effort would not be in vain, as the evidence upon which each party relied in support of its contention would be accessible to the public, and it would be enabled to make an intelligent study of the controversy.

In 1896 a notable conference of the friends of arbitration from all parts of the United States was held in Washington to urge upon our government the making of a treaty of arbitration with Great Britain.

That movement resulted in the framing of a convention in January, 1897, signed by Mr. Olney, Secretary of State, and Sir Julian, afterward Lord, Pauncefote. These two eminent statesmen, while they agreed that most questions of an international character might be referred to an impartial and neutral arbitrator for decision, also agreed that there were other

* A lecture delivered in Dr Foster's course in American Diplomacy in Columbian University, Washington, D. C., December 8, 1903.

questions which nations would not stipulate in advance to submit to that method of adjudication. Prominent among these were territorial disputes, and in their convention they provided that all such disputes should be referred to a tribunal to be composed of six judges, three to be selected by each government. That treaty failed of ratification in the Senate by a close vote, but it indicated the method which has been followed with such successful results by President Roosevelt and Secretary Hay respecting the Alaskan boundary.

From the very beginning of our independence as a nation the boundary line dividing the United States and Canada has been the source of almost constant discussion, often of angry controversy, and more than once has brought the countries to the brink of war. As in the Alaskan question, these disagreements have arisen mainly from a want of correct geographic knowledge on the part of the negotiators of the treaties. For instance, in the treaty of peace and independence of 1783, in which an attempt was made, as stated, to set forth the boundary with such accuracy that all disputes which might arise in the future would be prevented, the initial point on the east was fixed at the mouth of the St Croix River, in the Bay of Fundy. But when it was sought to establish the boundary line, it was found that there was no river in that locality popularly known as the St Croix, but that there were two considerable rivers emptying into the Bay of Fundy, both of which had other names than that mentioned in the treaty. This question was settled amicably by the unanimous action of a commission.

It was, however, followed by a controversy as to the ownership of the islands in and near Passamaquoddy Bay. After years of diplomatic discussion, it was referred to a commission of one American and one Englishman, and they reached a settlement without the intervention of an umpire.

The commission established the line to the head of the St Croix River, but the boundary from the St Croix along the Maine-New York frontier to the St Lawrence proved to be the most irritating, difficult, and tedious of the disputes between the United States and Great Britain It was first referred to commissioners, who failed to agree, and after much diplomatic wrangling was submitted to the arbitration of the King of the Netherlands, the validity of whose decision was questioned, and it was thrown back into diplomacy. New surveys were made and a temporary boundary established, but it was not observed by the people in the vicinity. Strife occurred; a state of border warfare was created; Congress authorized the President to call out the militia, and voted $10,000,000 for public defense. An open conflict between the two nations seemed imminent. The commander-in-chief of the army, General Scott, was dispatched to the frontier, and through his interposition a temporary border truce was arranged. After still further delays, in 1842 the Secretary of State, Mr Webster, and a special plenipotentiary from Great Britain, Lord Ashburton, agreed upon a treaty fixing accurately that boundary. It is an interesting fact that the essential points of that dispute were similar to those as to the Alaskan boundary. The "highlands" and the "ocean" became the words about which the northeastern controversy raged. Likewise the late subject of discussion at London was in great measure that respecting the phrase in the treaty, "the summit of the mountains," and the words "ocean" and "coast."

The line through the St Lawrence and the Great Lakes was adjusted by a commission after careful surveys, by which various islands which had been claimed and occupied by the Canadians

were transferred to the American side of the line, and others claimed by the Americans were placed on the Canadian side.

The fixation of the boundary from Lake Superior to the northwestern point of the Lake of the Woods was entrusted to a commission, but after five years of labor, during which they visited the region and expended $200,000 in surveys, they failed to agree. Under the stipulations between the two governments, the question should then have been referred to arbitration; but the experience in the arbitration of the Maine boundary did not encourage such a course. After long delays this portion of the frontier was adjusted by the Webster-Ashburton treaty of 1842, but this settlement has not proven completely satisfactory, owing to defective landmarks, as it is charged by Canadians that the United States Land Office has surveyed, platted, and sold to Americans a considerable extent of land in the Minnesota-Wisconsin section which really belongs to Canada.

The line from the Lake of the Woods to the Rocky Mountains was fixed by the treaty of 1818 to run along the 49th degree of north latitude.

The boundary from the Rocky Mountains to the Pacific Ocean remained for forty years a subject of controversy. It engaged the attention of successive administrations up to the presidency of Mr Polk, various treaties and arbitral propositions being advanced only to be rejected by one or the other of the two nations. The claim to the whole territory on the Pacific Ocean from California to the Russian possessions at 54° 40′ was asserted by the Democratic National Convention of 1844, and under the cry of "Fifty-four forty or fight" entered largely into the campaign which resulted in the election of Mr Polk. In his first message to Congress he declared our title to this region to be "clear and unquestionable," and he recommended Congress to extend jurisdiction over it. John Quincy Adams, who was recognized as the highest living American authority on international questions, held with President Polk that our title up to 54° 40′ was complete and perfect.

The controversy grew so animated that the chances of war were freely discussed; but the two nations found a better way of reconciling their differences, and, after anxious deliberation, Mr Buchanan, Secretary of State, and the British Minister, signed a convention in 1846 whereby the line of the 49th parallel was extended from the Rocky Mountains to the Pacific Ocean. By this act the vast domain now embraced in British Columbia was yielded to Great Britain, although our title to it had been declared unquestionable by a national convention, by the President in his message, by Congress through joint resolution, and by our highest authorities on international law.

One more step was necessary before our chain of title to a fixed and unquestioned line from the Atlantic to Pacific should be complete. The treaty of 1846 provided that the water line of the boundary should follow the middle of the channel which separates the continent from Vancouver Island. In this body of water lie a number of islands, and it was not clear which was "the middle of the channel" among these islands. In this state of uncertainty the islands were being populated by both Americans and Canadians, and conflicts of authority arose. Efforts were made to reach an agreement through diplomacy, but they failed. In 1856 a joint commission was appointed, but the members, after visiting the region in dispute, were unable to agree. The subject went back into diplomacy, and more than ten years were spent in fruitless discussion. In 1859 the settlers on San Juan Island came into conflict, the troops of the two coun-

tries became involved, and a collision seemed imminent. A second time the services of General Scott were invoked, and he arranged for a joint and peaceful occupation by troops of the two nations, but with difficulty were they able to prevent conflicts of the civil authorities. Finally, when the Joint High Commission to arrange the Alabama claims and other matters met in Washington in 1871, the question of the true channel was submitted to the arbitration of the Emperor of Germany, and he rendered an award in favor of the contention of the United States.

The foregoing review shows, first, what a perennial source of trouble have been our boundary disputes with Canada, and what a threatening peril to our peace it is to leave them unsettled. It is seen that every step of the frontier line, from the initial point on the Atlantic to the last water channel on the Pacific, has been a matter of controversy, and sometimes of such bitter contention as even to threaten war. Second, our public men and the government have not found a strong title to territory a bar to the submission of boundary questions to the adjudication of a commission or an arbitrator. In repeated instances have we given up territory which has been in possession of our citizens for years. Third, while our northern boundary has been adjusted by means of treaties, commissions, and arbitration, the Alaskan Tribunal was the first instance in which an equal number of jurists from each government have sat as a court, observing the forms of judicial proceedings, and rendering a decision binding upon the parties litigant. The result of its labors certainly confirms the wisdom of the President and Secretary of State in devising this method of adjustment of a most embarrassing controversy.

As there seems to exist in the public mind a vague and ill-defined idea of the questions at issue between the two governments which were submitted to the Tribunal for adjudication, it may be well to make as brief a statement as may be of these questions. They depended entirely for their solution upon the construction and application of the stipulations of the treaty entered into in 1825 between Great Britain and Russia. This treaty defined the rights of the two parties, first, in the North Pacific Ocean; and, second, on the northwest coast of North America. In order to accurately fix the latter a boundary line was agreed upon dividing the possessions of Russia from those conceded to Great Britain, and this boundary consisted of a water line and one upon the mainland.

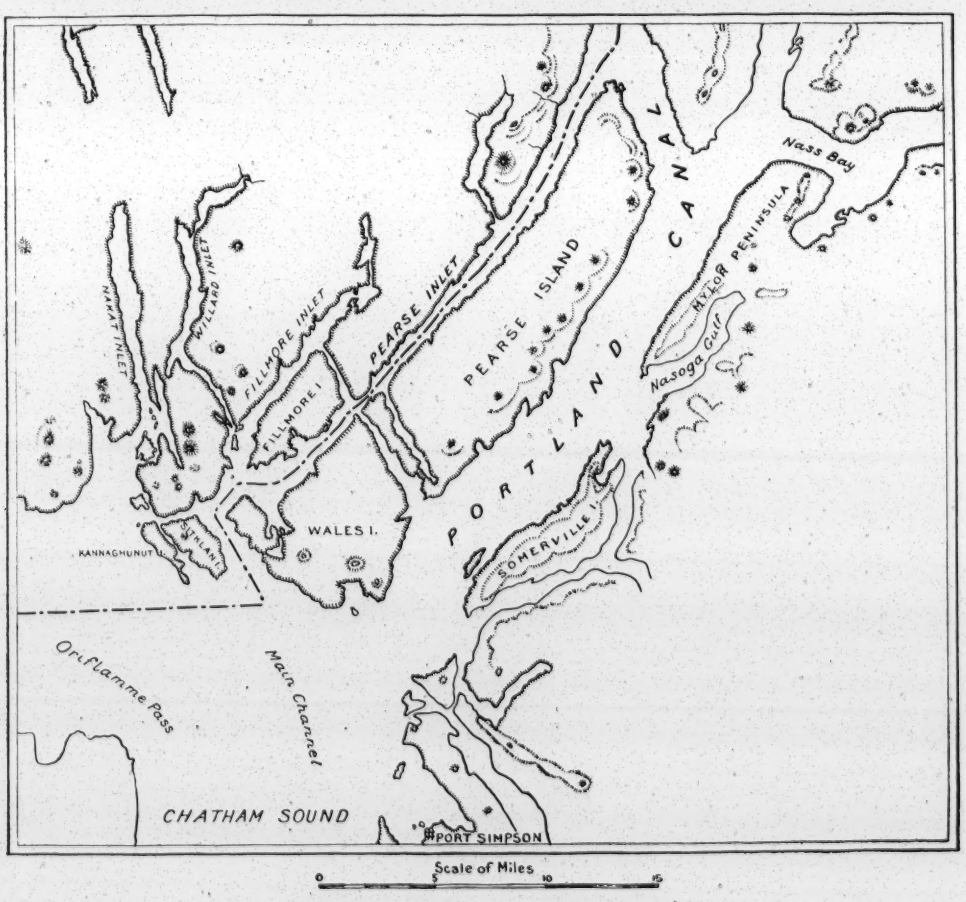
The rights of the parties continued to be governed by this treaty up to 1867, when Russia ceded and transferred all its territorial possessions in America to the United States, and in doing so she inserted in the treaty of cession to the United States the exact text of the treaty with Great Britain of 1825 relating to the boundary. Hence, in order to determine the territorial rights of Alaska and Canada, recourse must necessarily be had to the Russo-British treaty.

In the official and public discussion which preceded the treaty of January 24, 1903, creating the Alaskan Boundary Tribunal, and in the document submitted by the two governments to that body, as also in the oral argument before it, much was said about the historical facts and negotiations preceding and attending the signing of the treaty of 1825, and the acts of the governments and their officials since that event, such as the publication of maps and charts, occupation of the territory in dispute, and the admissions or statements of officials. But it was conceded on both sides that all these matters had no other influence on the questions at issue than to aid in the interpretation of the stipulations of the treaty.

The negotiators of the treaty of 1825, in setting forth the boundary line, were governed by the geographical knowl-

edge within their reach at that day. As early as the sixteenth century explorers had visited the northwest coast of America, but up to the last decade of the eighteenth century very little accurate knowledge of that region existed. Between 1792 and 1794 Captain Vancouver, of the British navy, visited this coast, sent out by his government to discover the supposed passage or water connection between the North Atlantic and Pacific Oceans. He made very careful surveys of the coasts of the continent and islands, and his narrative and charts, giving detailed results of his surveys, were published in 1798. These were the main sources of information upon which the negotiators sought to fix in the treaty of 1825 the boundary line between the Russian and British possessions.

They described the water line as follows: "Starting from the southernmost point of the island called Prince of Wales Island, . . . the said line shall ascend northward along the passage called Portland Channel as far as the point of the mainland, where it reaches the 56th degree of north latitude." The first matter which the tribunal had to determine was, what is the Portland Channel as described in the treaty, and



Map Showing Boundary in Portland Canal

to draw the line in accordance therewith from the southern point of Prince of Wales Island to the 56th degree of north latitude.

An examination of the maps will show that the body of water variously described as Portland Channel or Canal is composed in part of two inlets from the ocean, one a broad and easily navigable channel to the south, and to the north a narrow, somewhat tortuous, and unsafe passage. Between these passages lie a group or series of islands. The American contention was that the broad or southern passage was the Portland Channel of the treaty. The British claim was that the narrow or northern passage was the one intended by the negotiators. Vancouver's charts and later maps favored the American view, but his Narrative seemed to support the British case. The Tribunal decided against the American contention, but did not accept in full the British claim, as the two larger islands only were made British territory, and the two smaller islands involved in the controversy were awarded to the United States. This part of the decision has occasioned the most bitter criticism and is the chief matter of complaint in Canada. This feeling is in part explained by the fact that Port Simpson, situated on the southern side of the entrance to Portland Canal, has been fixed upon as the Pacific terminus of the newly projected transcontinental railway, and it was urged that, for strategic purposes, all the islands on the north or opposite sides should belong to Canada.

The other work of the Tribunal was to determine the mainland boundary line. The treaty provided that from the head of Portland Channel the line should be drawn to the 56°, and "from this latter point the line of demarcation shall follow the crest of the mountains situated parallel to the coast. . . . That whenever the crest of the mountains which stretch in a direction parallel to the coast from the 56th degree of north latitude . . . may lie at a distance of more than ten marine leagues from the ocean the boundary between the British possessions and the coast strip (*lisière*) mentioned above as having to belong to Russia, shall be formed by a line parallel to the sinuosities of the coast, and which can in no case be more distant therefrom than ten leagues."

Vancouver saw as he sailed up and down the northwest coast of America, as likewise modern tourists, all along the Alaskan mainland a constant series of mountains. He made no explorations in the interior of the continent; but in drawing his charts he depicted a regular and continuous chain of mountains from the head of Portland Canal up to Mt St Elias, running around the heads of all the inlets and arms of the sea. The map-makers who succeeded Vancouver adopted with more or less accuracy this feature of his charts. It was this topographical indication which the negotiators had in view when they drafted the text of the treaty just quoted. They regarded this supposed mountain chain as a natural and proper boundary.

But later explorations have shown that the mountain chain depicted by Vancouver and other cartographers of the period preceding the treaty had no existence in fact, but that the mainland, extending back for ten leagues and more from the coast, is what has been termed "a sea of mountains," with no dominant and well-defined chain. The American claim, therefore, was that the natural boundary contemplated by the treaty having no existence in fact, the ten marine league line mentioned therein should apply, and that the United States boundary should follow the sinuosities of the coast and always ten marine leagues therefrom, passing around all the inlets of the sea.

On the other hand, the British con-

tention was that the crests of the mountains nearest to the sea should be taken as the boundary line. The Canadian experts claimed to have established a series of peaks or mountain chains sufficiently parallel to the coast to meet the requirements of the treaty. In conformity with this theory a boundary line delineated on the map was put forward, which rarely diverged more than five miles from the sea and often was less than a mile therefrom, which cut across the heads of all the inlets, divided the "coast strip" or *lisière* of the treaty into sixteen disconnected sections of territory, and transferred to Canada towns, settlements, industrial establishments, and mines which had been in undisputed possession of Americans for many years.

The Tribunal decided that, under the treaty, the United States was entitled to a continuous strip of territory which extended around the heads of all the inlets, thus excluding all contact of British territory with the sea from Portland Canal north to Mt St Elias. It also fixed the eastern or interior boundary line at designated mountain peaks to conform to this decision. While this interior line did not extend ten leagues from the ocean (the distance put forward in the case of the United States), it was a substantial acceptance of the most material claim of this country, and the result has been so regarded on both sides.

Much time was consumed and learned argument applied to the meaning of the terms of the treaty, "the crest of the mountains," the "ocean," the "coast," "sinuosities of the coast," etc., which can not be followed in the time at my command, but the foregoing is, I trust, a sufficient exposition to enable those not already informed to understand the two principal points at issue and how they were settled.

I turn now to a consideration of the composition, the preliminary work, and the proceedings of the Tribunal. It has already been stated that it was made up of three members appointed by each government. The treaty creating the Tribunal required that its members should be "impartial jurists of repute, who shall consider judicially the questions submitted to them, each of whom shall first subscribe an oath that he will impartially consider the arguments and evidence presented to the Tribunal and will decide thereupon according to his true judgment."

The President nominated on his part Elihu Root, of New York, Secretary of War; Henry Cabot Lodge, Senator of the United States from Massachusetts, and George Turner, late Senator of the United States from the State of Washington. Since the dissolution of the Tribunal it has been disclosed that the Canadian Government complained to the British Colonial Office that the members nominated by the President of the United States were not such persons as were contemplated by the treaty, to wit, "impartial jurists of repute;" but it does not appear that the British Government regarded this complaint of such a serious character as to bring it to the attention of the President. It was alleged that one of the American members had expressed himself publicly, sometime previous to his appointment, as strongly convinced of the justice of the claim of his government. It was also objected that no one of the three was taken from judicial life, and that they all might be considered as political rather than legal representatives of their country.

Whatever appropriateness there may have been in the objections urged by Canada, the sequel showed that the selection of the President was entirely fitting. It would be difficult to name three men in the United States with greater experience in and knowledge of public affairs, with better trained minds for the work they had to do, and who

possessed in a greater degree the confidence of their countrymen. It will doubtless be gratifying to you to state that they acquitted themselves in their delicate positions with entire credit to their country, without a word of criticism of their conduct, so far as I am aware, in either official or social circles of the British capital, and, without indulging in invidious comparisons, it may be said that they displayed a judicial temperament at least equal to their Canadian colleagues, and were as susceptible to the arguments of opposing counsel. On one of the points strongly contended for by the United States, that of Portland Channel, they decided against their own Government, an example which seems to have had no effect on their Canadian associates.

Even in the United States some press criticism has been passed upon the action of the President in this matter, and it has been asserted that he should have named judges of the United States Supreme Court or other high judicatory for the positions. It is due to the President to state that he offered the appointment to one of the justices of the Supreme Court, and that the latter declined, as it is understood, on the ground that he did not regard the post as in the proper line of his duties, and that it was not just to his associates to accept a position which would impose additional labor upon them. A second justice was then approached with a like result. There seems to be a growing sentiment in this country that the members of our highest court should not be called upon to discharge functions of a semi-political character, such as those relating to boundary disputes, nor that they should be burdened with additional duties when their labors are already sufficiently onerous. A similar view has been expressed by some of the British press since the decision of the Tribunal, to the effect that the Lord Chief Justice of England should not have been placed in the embarrassing position of having to pass judgment against his country upon a question so greatly political, and which has consequently exposed him to bitter criticism.

The British Government named as members of the Tribunal Baron Alverstone, Lord Chief Justice of England; Sir Louis A. Jetté, Lieutenant Governor of Quebec, and John D. Armour, Judge of the Supreme Court of Canada. Judge Armour died soon after his appointment, and the vacancy was filled by A. B. Aylesworth, Esq., a prominent member of the bar of Toronto.

The duty of the Tribunal was prescribed to be to render a decision which was to be made up of answers to seven questions specifically set forth in the treaty. Experience has shown that the work of courts of arbitration and international commissions is not infrequently nullified or impaired by their members exceeding their powers in rendering their decision, or by departure from the terms of reference. All error in that direction was avoided in this instance by the careful manner in which the points at issue were set forth in the treaty.

The Case of each of the two parties was required to be prepared and delivered to the opposite party within two months from the date of the exchange of ratifications of the treaty, which occurred March 3, 1903. This was a short time in which to do such an important work; but, as the matter had already been the subject of much discussion and research, it was practicable to accomplish it in the period fixed. The Case for each government consisted of a statement of its views and contentions on the seven questions submitted to the Tribunal, accompanied by the documents, the official correspondence, and all other evidence in writing or in print upon which it relied. The Case of the United States, with the appendices, constituted a quarto volume

of about 650 pages and an atlas of maps, and the British case was of approximately the same length and character.

After receipt by each government of the Case of the other, a Counter-case in reply thereto was to be prepared and delivered within a like period of two months. Upon receipt of the American Case the British agent asked for an extension of two months, stating that it would be impossible to prepare a Counter-case for Great Britain within the period fixed by the treaty. Our government declined to agree to this extension of time on the ground that the reasons contemplated by the treaty had not been alleged and did not exist. The Counter-cases were accordingly exchanged within the period fixed therefor.

The third step in the pliminary proceedings was the preparation by counsel of a printed Argument, based upon the Case and Counter-case, and this also was to be prepared and delivered within two months after receipt of the Counter-case. This delivery was effected on September 2, and on the 3d of that month the Tribunal held its first meeting in London.

There was set apart in the Foreign Office in Downing street a series of apartments for the use of the Tribunal and those connected with it. The public sessions were held in the ambassadorial reception-room, a large and commodious hall, well lighted and artistically decorated. Adjoining this was a consultation-room for the private sessions of the Tribunal, and connected with it was the state dining-room, where a bountiful collation was served at the daily recess of the Tribunal. Adjoining the other end of the ambassadorial hall were a number of spacious rooms devoted to the use of the agent and counsel of the United States and the British agent and counsel.

I mention this matter in some detail in order that you may contrast it with the inadequate accommodations which are provided by our government for its foreign office, the Department of State. It has no facilities whatever for receiving and entertaining courts of arbitration, international commissions, and special diplomatic missions which are so frequently assembled in Washington. When the Anglo-American Joint High Commission met here a few years ago, quarters had to be taken at one of the hotels for its sessions, and we experience the same mortification almost every year. It is earnestly to be hoped that the present Congress will not adjourn without adopting adequate measures to remedy this discreditable condition and provide the Department of State with such accommodations as will enable our government to receive with proper courtesy its international guests.

The first meeting of the Tribunal was confined to an exchange of credentials of the members of that body and of the agents of the two governments, fixing the days and hours of the sessions, and the method which should be observed by counsel in the oral argument which was contemplated by the treaty. It was arranged that sessions should be held five days in the week, adjourning on Fridays to the next Monday, and that they should continue from 11 a. m. to 4 p. m. The British counsel were to open the argument, and it was to be closed by the American counsel, three lawyers on each side to speak alternately. The Attorney General of England, Sir Robert B. Finlay, opened for Great Britain, followed by David T. Watson, Esq., for the United States; Mr. Christopher Robinson, of Canada; Hon. Hannis Taylor for the United States; the Solicitor General of England, Sir Edward H. Carson; and Hon. J. M. Dickinson closing for the United States.

An adjournment of nine days was taken for the convenience of counsel, and on September 12 the oral argument began. It occupied eighteen days, the

only interruption being an adjournment upon the announcement of the death of Sir Michael H. Herbert, the British Ambassador in Washington, and to attend the funeral services held in memory of this young and brilliant diplomatist, who had united in framing and signing the treaty by which the Tribunal was created.

The time consumed in the oral argument may attract the notice of lawyers who are accustomed to the more expeditious methods in our domestic courts, the Supreme Court of the United States, for instance, rarely permitting arguments, even in important cases, to extend beyond two or three days; but such a period is not unusual in international tribunals. In the Fur Seal, or Bering Sea arbitration at Paris in 1893, the oral argument occupied forty-three days.

A noticeable feature of the London Tribunal was the marked contrast in the manner of argument or delivery between the British and American lawyers. The former were very deliberate in speech, rarely raising the voice, accentuating words, or using gestures; they sought to impress the court by their careful presentation of the facts and the cogency of their reasoning. This method was doubtless very effective, but when it extended in the person of one advocate through six or seven days it became somewhat tedious. On the other hand, the American counsel were vigorous in speech, frequent in emphasis, and somewhat active in gesture. They did not hesitate to indulge in a witticism to impress a point, and sometimes even ventured upon an amusing anecdote to illustrate their argument, which seemed to be welcomed by the court and enjoyed by the opposing counsel.

It is gratifying to note that during the entire sessions of the Tribunal the utmost good feeling and courtesy prevailed, not a single untoward incident occurring to mar the harmony of the proceedings.

The oral argument was closed on October 8, after which the Tribunal went into secret session. On October 20 its decision was delivered to the two agents representing their respective governments. As the treaty which provided for the adjudication and created the Tribunal did not go into effect till March 3, 1903, the entire proceedings occupied less than eight months, which constitutes an instance of promptness in international adjudication of magnitude and gravity almost without parallel.

As I have already given the substantial results of the decision, it is hardly necessary to repeat or elaborate them. The engrossed decision or award in duplicate was signed by Lord Alverstone and the three American members. The decision was accompanied by a series of five maps indicating thereon the boundary as set forth in the decision. These maps were attested by the signature of all the six members of the Tribunal.

The two Canadian members have been criticised, too severely, I think, for their action in refusing to sign the decision. They might find their defense in the language of the treaty itself, which says: "The decision . . . shall be signed by the members of the Tribunal assenting to the same." They also might cite distinguished precedents for their conduct. The Lord Chief Justice of England, Sir Alexander Cockburn, who represented Great Britain on the arbitration tribunal at Geneva which adjusted the Alabama claims, not only refused to sign the award, but accompanied it with a vigorous protest and rather unseemly conduct.* A similar

*Hon. Caleb Cushing, one of the American counsel, in referring to the closing session of that Tribunal, said: "To the universal expression of mutual courtesy and reciprocal good will there was but one exception, and that exception too conspicuous to pass without notice. The instant that Count Sclopis [the President] closed, and before the sound of his last

precedent is to be found in the Halifax fisheries arbitration of 1877, when the American member not only refused to sign the award, but questioned its validity. A better practice was observed in the Fur Seal arbitration at Paris in 1893. The two American members, Justice Harlan and Senator Morgan, were outvoted on almost every one of the six points submitted to the Tribunal; but, without withdrawing their votes, they cheerfully united with their colleagues in signing the award.

The two Canadian members of the London Tribunal did, however, incur more deserved criticism in their action in giving to the press, on the same day the decision was announced, a carefully prepared interview, in which they declared that the decision was not judicial in its character, the plain inference from which was that the majority members of the court had been influenced by improper motives, as the treaty required that they should determine "judicially" the questions submitted to them. They further gave it to be understood that their British colleague, after agreeing with them in their position as to Portland Channel, changed his attitude and voted with the American members; and they added that there is "no process of reasoning whereby the line thus decided upon by the Tribunal can be justified." It is hardly necessary for me to accentuate the impropriety of judges arraigning in the public press their colleagues on the bench for improper motives and inconsistent conduct. Lord Alverstone has said, referring to this matter, that he declined to justify or explain his conduct, because such a course would be a death blow to the confidence reposed in the British bench. He needs no vindication. No living man has had greater experience in international adjudications, and no one has done more to preserve peace and good will between the two English-speaking nations.

In view of the substantial failure to sustain the British contention as to the boundary, it is not strange that there have been angry criticism and bitter disappointment expressed in Canada. Similar feelings were manifested in England over the Geneva award. The people of the United States were very angry at the Halifax award, and were by no means pleased with the result of the Fur Seal arbitration at Paris; but the sober second thought of these Anglo-Saxon peoples has been that, however disappointing the outcome, this process of adjusting international disputes is better than to continue the controversies, and infinitely better than a resort to war. The British agent, Hon. Clifford Sifton, immediately after the announcement of the decision in London, said publicly in the most kindly spirit: "I have to say that the agent and counsel of the United States have acted with perfect courtesy and good faith throughout." And since his return to Ottawa and the resumption of his place in the Dominion cabinet he has announced that the decision will be accepted and carried into effect in good faith.

President Roosevelt has been credited by the public press with the statement that the result at London was "the greatest diplomatic victory of the United States during the present generation." It is not becoming in one who was a participant in the proceedings so characterized to discuss this declaration. I

words had died on the ear, Sir Alexander Cockburn snatched up his hat, and, without participating in the exchange of leave-takings around him, without a word or sign of courteous recognition for any of his colleagues, rushed to the door and disappeared, in the manner of a criminal escaping from the dock, rather than a judge separating, and that forever, from his colleagues of the bench. It was one of those acts of discourtesy which shock so much when they occur that we feel relieved by the disappearance of the perpetrator."

The Treaty of Washington, by Caleb Cushing. New York, 1873, p. 128.

may say, however, without impropriety that the greatest value of the decision is not in the detailed terms of the award, but in the fact that it brought to a conclusion an irritating controversy, that it removed a serious obstacle to better relations between these two neighboring countries.

The chief credit on the American side for this result is due to the President and the Secretary of State, who had the courage, in spite of the prevailing sentiment that it would be a useless proceeding and against many protests, to submit the question to a judicial tribunal. Still greater credit is due the Prime Minister of Canada, Sir Wilfrid Laurier, who, in the face of stronger opposition, consented to such a reference. While the outcome is not such as he desired, it must be a relief to him to know that this dangerous subject has been removed from the arena of controversy, and I feel sure that in time his people will recognize that he acted wisely and for the best interests of his country.

DECISION OF THE ALASKAN BOUNDARY TRIBUNAL

UNDER THE TREATY OF JANUARY 24, 1903, BETWEEN THE UNITED STATES AND GREAT BRITAIN

WHEREAS by a Convention signed at Washington on the 24th day of January 1903, by Plenipotentiaries of and on behalf of His Majesty the King of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the seas, Emperor of India, and of and on behalf of the United States of America, it was agreed that a Tribunal should be appointed to consider and decide the questions hereinafter set forth, such Tribunal to consist of six impartial Jurists of repute, who should consider judicially the questions submitted to them each of whom should first subscribe an oath that he would impartially consider the arguments and evidence presented to the said Tribunal, and would decide thereupon according to his true judgment, and that three members of the said Tribunal should be appointed by His Britannic Majesty and three by the President of the United States:

And whereas it was further agreed by the said Convention that the said Tribunal should consider in the settlement of the said questions submitted to its decision the Treaties respectively concluded between His Britannic Majesty and the Emperor of All the Russias under date of the 28th (16th) February A D 1825 and between the United States of America and the Emperor of All the Russias, concluded under date of the 18th (30th) March A D 1867, and particularly the Articles III, IV and V of the first mentioned Treaty, and should also take into consideration any action of the several Governments or of their respective Representatives, preliminary or subsequent to the conclusion of the said Treaties so far as the same tended to show the original and effective understanding of the parties in respect to the limits of their several territorial jurisdictions under and by virtue of the provisions of the said Treaties

And whereas it was further agreed by the said Convention, referring to

Articles III, IV and V of the said Treaty of 1825, that the said Tribunal should answer and decide the following questions:—

1. What is intended as the point of commencement of the line?

2. What channel is the Portland Channel?

3. What course should the line take from the point of commencement to the entrance to Portland Channel?

4. To what point on the 56th parallel is the line to be drawn from the head of the Portland Channel, and what course should it follow between these points?

5. In extending the line of demarcation northward from said point on the parallel of the 56th degree of north latitude, following the crest of the mountains situated parallel to the coast until its intersection with the 141st degree of longitude west of Greenwich, subject to the conditions that if such line should anywhere exceed the distance of 10 marine leagues from the ocean, then the boundary between the British and the Russian territory should be formed by a line parallel to the sinuosities of the coast and distant therefrom not more than 10 marine leagues, was it the intention and meaning of the said Convention of 1825 that there should remain in the exclusive possession of Russia a continuous fringe, or strip, of coast on the mainland not exceeding 10 marine leagues in width, separating the British possessions from the bays, ports, inlets, havens, and waters of the ocean, and extending from the said point on the 56th degree of latitude north to a point where such line of demarcation should intersect the 141st degree of longitude west of the meridian of Greenwich?

6. If the foregoing question should be answered in the negative and in the event of the summit of such mountains proving to be in places more than 10 marine leagues from the coast should the width of the *lisière*, which was to belong to Russia be measured (1) from the mainland coast of the ocean, strictly so-called along a line perpendicular thereto, or (2) was it the intention and meaning of the said Convention that where the mainland coast is indented by deep inlets forming part of the territorial waters of Russia, the width of the *lisière* was to be measured (*a*) from the line of the general direction of the mainland coast, or (*b*) from the line separating the waters of the ocean from the territorial waters of Russia, or (*c*) from the heads of the aforesaid inlets?

7. What, if any exist, are the mountains referred to as situated parallel to the coast, which mountains, when within 10 marine leagues from the coast, are declared to form the eastern boundary?

And whereas His Britannic Majesty duly appointed Richard Everard, Baron Alverstone, G.C.M G. Lord Chief Justice of England, Sir Louis Amable Jetté K C M G Lieutenant-Governor of the Province of Quebec, and Allen Bristol Aylesworth one of His Majesty's Counsel, and the President of the United States of America duly appointed the Honourable Elihu Root Secretary of War of the United States, the Honourable Henry Cabot Lodge, Senator of the United States from the State of Massachusetts and the Honourable George Turner of the State of Washington, to be members of the said Tribunal.

Now therefore we the Undersigned having each of us first subscribed an oath as provided by the said Convention and having taken into consideration the matters directed by the said Convention to be considered by us, and having judicially considered the said questions submitted to us, do hereby make Answer and Award as follows:—

In answer to the *first* question

The Tribunal unanimously agrees that the point of commencement of the line is Cape Muzon.

In answer to the *second* question

The Tribunal unanimously agrees that the Portland Channel is the Channel which runs from about 55° 56′ NL and passes to the north of Pearse and Wales Islands.

A majority of the Tribunal that is to say Lord Alverstone Mr Root Mr Lodge and Mr Turner decides that the Portland Channel after passing to the north of Wales Island is the channel between Wales Island and Sitklan Island called Tongass Channel. The Portland Channel above mentioned is marked throughout its length by a dotted red line from the point B to the point marked C on the map signed in duplicate by the members of the Tribunal at the time of signing their decision.

In answer to the *third* question

A majority of the Tribunal that is to say Lord Alverstone Mr Root Mr Lodge and Mr Turner decides that the course of the line from the point of commencement to the entrance to Portland Channel is the line marked A B in red on the aforesaid map.

In answer to the *fourth* question

A majority of the Tribunal that is to say Lord Alverstone Mr Root Mr Lodge and Mr Turner decides that the point to which the line is to be drawn from the head of the Portland Channel is the point on the 56th parallel of latitude marked D on the aforesaid map and the course which the line should follow is drawn from C to D on the aforesaid map.

In answer to the *fifth* question

A majority of the Tribunal that is to say Lord Alverstone Mr Root Mr Lodge and Mr Turner decides that the answer to the above question is in the affirmative

Question five having been answered in the affirmative question *six* requires no answer.

In answer to the *seventh* question

A majority of the Tribunal that is to say Lord Alverstone, Mr Root, Mr Lodge and Mr Turner decides that the mountains marked S on the aforesaid map are the mountains referred to as situated parallel to the coast on that part of the coast where such mountains marked S are situated and that between the points marked P (mountain marked S 8,000) on the north and the point marked T (mountain marked S 7,950) in the absence of further survey the evidence is not sufficient to enable the Tribunal to say which are the mountains parallel to the coast within the meaning of the Treaty.

In witness whereof we have signed the above written decision upon the questions submitted to us.

Signed in duplicate this twentieth day of October 1903.

ALVERSTONE.
ELIHU ROOT
HENRY CABOT LODGE
GEORGE TURNER

Witness
REGINALD TOWER :
Secretary.

THE RECLAMATION OF THE WEST*

By F. H. Newell,

In Charge of the Hydrographic Branch and Chief Engineer of the Reclamation Service, U. S. Geological Survey.

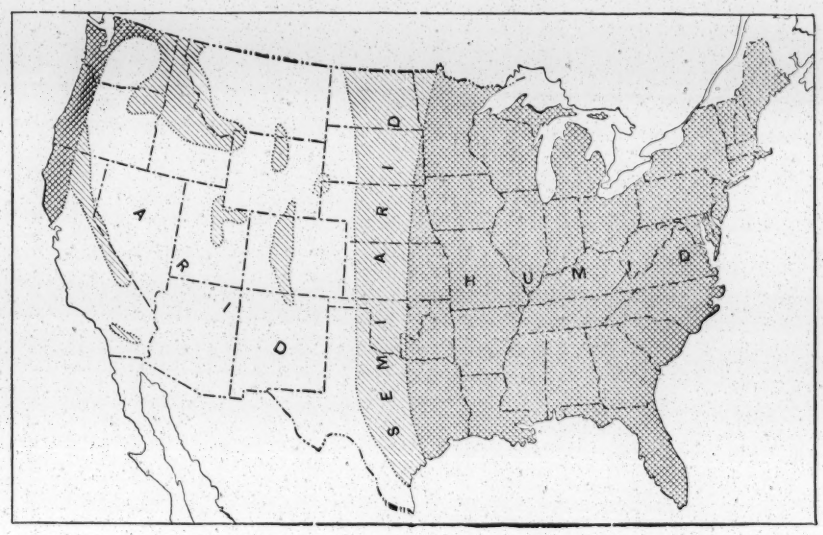
CONGRESS, in the spring of 1902, following the recommendations made by President Roosevelt in his first message, took up the matter of the reclamation of the arid West and on the 17th of June, a day celebrated in American history, the President signed the bill known as the reclamation law, setting aside the proceeds from the disposal of public lands in thirteen western states and three territories for the construction of irrigation works. At that time the matter attracted little attention other than from those who were interested in the measure. It was thought to be simply a western scheme which had been successfully lobbied through against the opposition of the leaders of both parties. As time has gone on the people of the country have begun to appreciate more and more the importance of the law not only to the West but to the country as a whole. It is now appreciated that if that law is well administered it will mean much to the future development of our country and a complete change in some physical and economic features.

As geographers we are interested in the development of the country and in the changes that take place, and as citizens of the United States we are concerned in seeing that every resource is put to its best use, and that the country is developed to the fullest possible extent. The object of the reclamation law is primarily to put the public domain into the hands of small land owners—men who live upon the land, support themselves, make prosperous homes, and become purchasers of the goods manufactured in the East and the cotton raised in the South. At the same time this is to be done in such a way that it will not become a burden to the taxpayers.

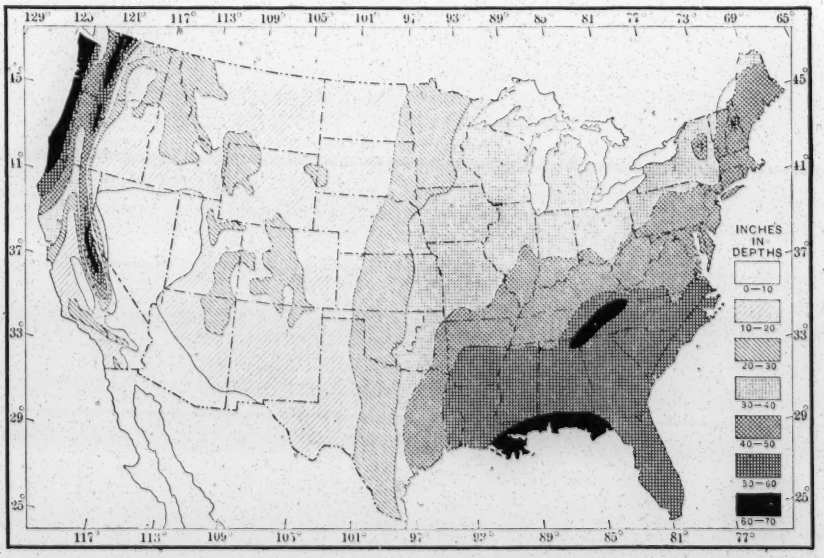
The money for the reclamation fund is from the disposal of public lands in the West. This money is returned again to the fund by repayment by the persons who are directly benefited. This matter of refunding is one of the most essential features of the law. Many considered this provision as trivial, but the more the effect of the law is studied the more thoroughly is it demonstrated that this repayment is one of the best safeguards of the law, keeping the administration clean and business-like. The requirement that each project must be worth what it costs is a safeguard both in public and in private undertakings. Attacks upon the law have been made under the misconception that the eastern farmer is taxed to make western farms valuable, and that the government will be victimized by the lands passing into the hands of great corporations. These attacks would not be made if the men who utter them would read the law. It is carefully guarded in every respect, putting the lands into the hands of small owners and refunding to the treasury the cost of reclaiming the land.

This matter of irrigation and of western reclamation is by no means new. It has been discussed most thoroughly and persistently by one of our prominent members now gone before, John Wesley Powell. "The Major," as we all called him, in his early years made extensive explorations in the West, studying its topography, geog-

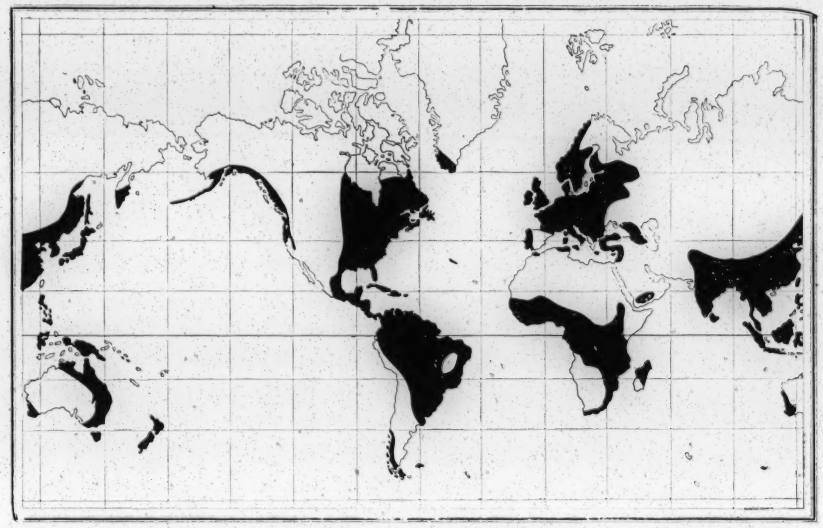
*An address before the National Geographic Society, November 6, 1903.



No. 1. Map showing Arid, Semi-Arid, and Humid Regions of the United States



No. 2. Map showing Mean Annual Rainfall in the United States



No. 3. Map showing Arid Regions of the World—the Humid Regions shown in Black

raphy, and geology. In the course of those researches he became greatly impressed with the great opportunities for development of this western arid land. He talked this matter in season and out of season, and many of his friends have said, "Now, Major, if you will only stop this irrigation talk we will do anything you want, but we can not have that." We are glad that he lived to see this law passed, and though it was not exactly on the lines he sketched in his original thesis, yet it follows his ideals. His report, written in 1876, is still one of the classics to which all refer.

BROAD PROVISIONS OF RECLAMATION LAW

The reclamation law is familiar to some of you, and there are here some men who have worked vigorously for it and who led the debate in Congress. It is sufficient to go briefly over some of the general provisions of this law. It commits to executive discretion nearly all of the details which make a law a success or a failure. It sets up a few large and important safeguards, and says in effect to the Secretary of the Interior, "Here is this money; take it and spend it for this purpose; get it back in the treasury and do the best you can with it." That is unquestionably the ideal condition, and the men who are working under it must make it a success. They have no excuse for a failure. Congress has been liberal, has given the Secretary wide discretion, and we have no apparent excuse for not obtaining the best possible results which the conditions will permit.

I have spoken of two or three of the large safeguards imposed, namely, the putting of the land into the hands of small owners who will live on it and cultivate it, and the refunding of the money to the treasury, the money to be used over and over again in a revolving fund. When the law was passed the matter did not seem very important. The amount of money involved did not seem large and the opponents of the bill had little appreciation of the situation. It covered into the treasury funds for the year 1901 and succeeding

No. 4. Map showing Location of Vacant Public Lands

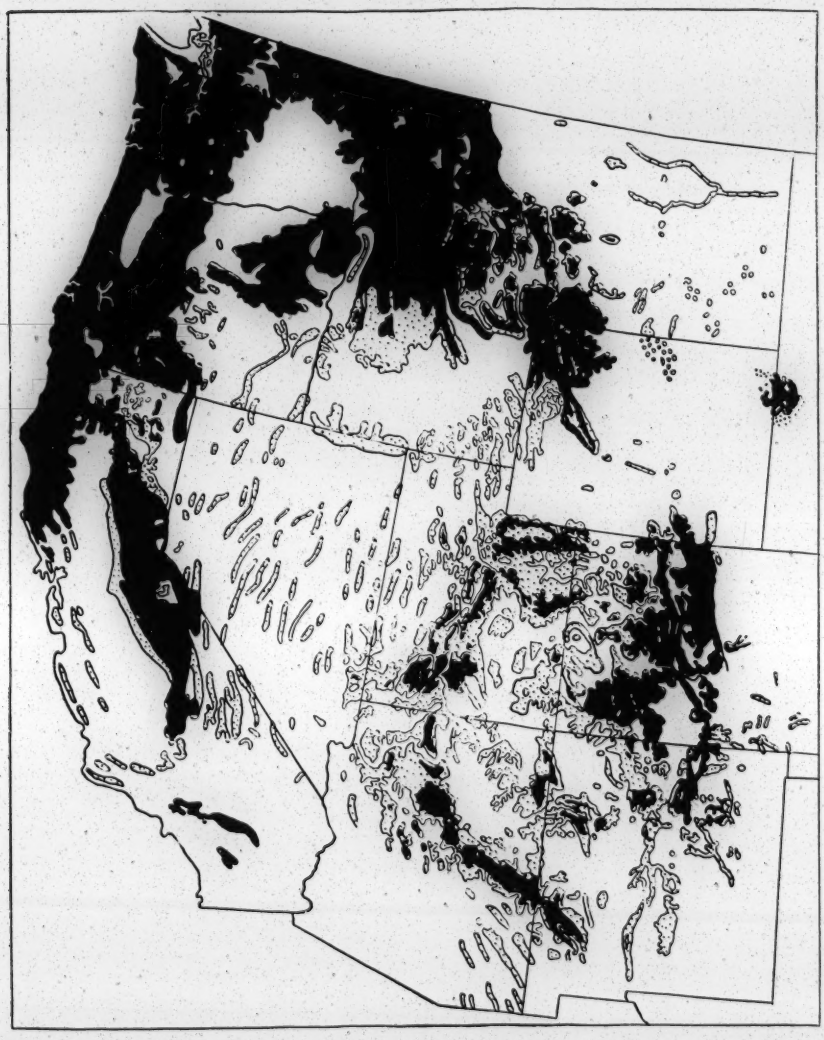
years, as follows: For 1901, $3,000,000; for 1902, $4,000,000 more, and for 1903 about $8,000,000; in all, now about $15,000,000. The fund at the present time is increasing rapidly.

THE RECLAMATION SERVICE

The Secretary of the Interior, to whom the whole matter is committed, in commencing the work, decided to put it in the hands of a man and an organization in whom he had and has confidence. Hon. Charles D. Walcott, Director of the U. S. Geological Survey, is the man whom the Secretary holds responsible for this work. He in turn is assisted by several men who since 1888 have been measuring the streams of the West, studying the water supply, and making an examination to ascertain how the lands can be reclaimed by irrigation.

The Geological Survey has for years been making a topographic map of the United States, and on that map are shown the streams, the reservoir sites in or near the mountains, and many other facts which are essential to a practical knowledge of the subject.

In addition to the topographic branch, the hydrographic division has been measuring the waters which may be



No. 5. Map showing Location of Forests and Woodlands of the West—Forests in Black, Woodlands Dotted

used or stored in these reservoirs. It was practicable to take experienced men out of the corps existing in the Geological Survey and to add to these from time to time, through civil service examinations, men who are experienced in the actual construction and operation of the work. Now there is an engineer corps of about 300 men, mostly young and active. A few have obtained age and maturity of judgment and will hold these younger men in check. The men are grouped in districts. At the head of each district is a man of experience who has been state engineer, as in the case of Idaho, or has had large experience in irrigation work. To him are assigned men who have had more or less experience. The plans made by these engineers are submitted to a board of

No. 6. Map of Irrigated and Irrigable Lands—Irrigated Areas in Black, Irrigable Areas Dotted

consulting engineers, comprising men of wide experience.

The work extends over thirteen states and three territories. These sixteen political divisions comprise the largest of the United States excepting Texas. Texas came into the Union as an independent republic, owning its vacant lands, and hence the land laws of the rest of the states are not applicable, nor is the law of June 17, 1902, but all of the large western states are included, aggregating an area of about one-half of the United States. Thus the development of nearly half of the United States is resting upon the best execution of this law.

The problems are not merely engineering. It is not sufficient to build canals and bring the water where the people can get it; but, more than this, there are an infinity of problems to be solved, and great tact must be used with people. When it comes to the question

No. 7. Map showing Approximate Location and Extent of Open Range in the United States

"The stock raising or grazing industry will always occupy 80 or 90 per cent of the arid lands of the West"

of dealing with water, men may be good citizens, but they can not be implicitly trusted when it comes to the question of water distribution. In Idaho they have the term "winter friendship." During the summer every man is at war with his neighbor over the division of water, but in the winter these troubles are forgotten and every one is on friendly terms. Summer is the time of storm and strife. So, in everything having to do with water, engineers must have not only knowledge but good sense, tact, and firmness.

To deal with the interests which are coming up in the distribution of water and the reclamation of land, it is necessary to organize the people into associations. These associations under the law must ultimately control and operate the works; through them the Secretary of the Interior can deal directly with a body of people, and they can divide the water among themselves and settle minor matters as best they can. The reclamation of the West is not only a scientific problem, but involves great tact and skill in administration.

THE PUBLIC LANDS

The public lands are of many kinds; from densely forested mountain slopes reaching up to the high mountains of the Rockies down to the vast low plains and deserts. Particular interest is attached to these high mountains and the forested slopes, for upon these depend to a large extent the future prosperity and the utilization of the agricultural lands of the West.

An Abandoned House on an Unirrigated Plain

The picture illustrates the impossibility of establishing homes on the public domain without first providing methods of irrigation

The extent of the forests is shown by diagram 5. In northern California and along the Pacific coast, in western Oregon and Washington, are the greatest forests remaining in the United States. Around the Yellowstone National Park and in the Rocky Mountain region in general are other important forests. In considering any question concerning the forests we must bear in mind that the word forest comprises a great variety of tree growth. In the East it usually means a dense growth. Out in Colorado or Wyoming you can sometimes see a half mile through what is called a forest. Thus, when we discuss forests on the public lands there must be some explanation of what kind of a forest we are talking about, if we are to be correctly understood.

A little scrubby growth of cedar or piñon may have great value to the pioneer, although it is not merchantable timber. These small trees furnish the poles and the posts which are so necessary to the settler. Even the small brush may supply the fuel which he must have for his home.

The present distribution of the public lands is exhibited by diagram 4. In black are the lands which have been taken up by individuals. Much of this public land is now used for grazing, but there are many thousand acres which with water will support hundreds of prosperous homes. In the extreme east of Colorado settlements have been made by what are called "the rain belters," who came into the dry country in the belief that the so-called "rain belt" would shift westerly as settlement progressed.

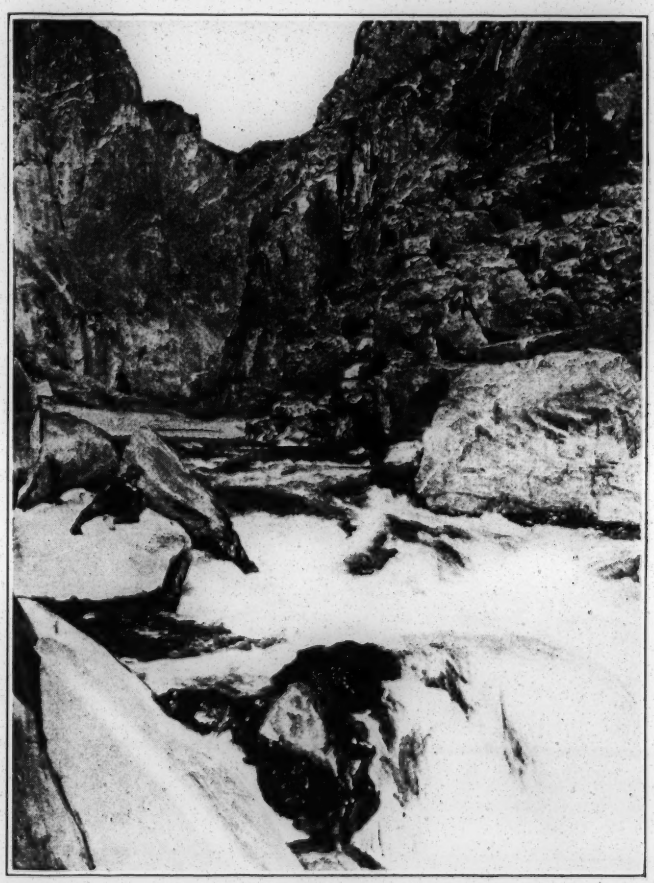
AREA WHICH CAN BE RECLAIMED

The area of land which can be reclaimed by irrigation is relatively small. If two or three per cent of the vast extent of arid lands of the United States are ultimately reclaimed and put under

cultivation, it will mean a population in the western half of the United States almost as great as that now in the eastern half of the country. Figure 6 shows the areas where it is probable that irrigation can be carried on, or where it is now being carried on and where it can further be extended. If the West is developed to the extent that all these patches indicate, we will have a wonderful change in the social and commercial relations of the United States as a whole.

The comparatively regular distribution of these irrigable lands in each state is notable. The entire extent of irrigation development in each state is of course very small, but if I am correctly informed, the proceeds from the small irrigated area in Colorado are already greater than from the mines.

While it is not likely that a very large proportion of the arid West will ever be reclaimed, yet nearly all the land has value in one way or another. The stock raising or grazing industry will always occupy eighty or ninety per cent of the arid lands of the West. It is the great industry as far as area is concerned, but in value of products is not as great as is the cultivation of the soil.



Top of Torrence Falls, Gunnison Canyon

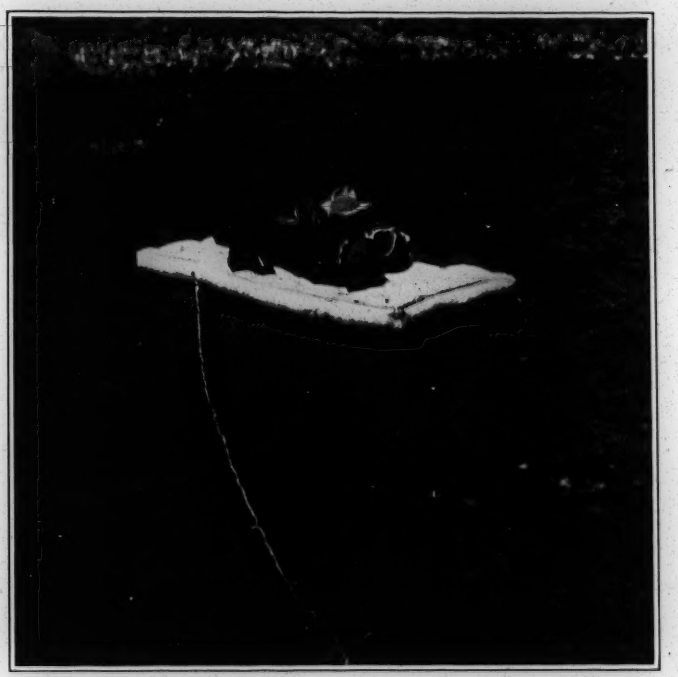
Attempts to go down Gunnison Canyon by boats having been unsuccessful, Mr Fellows, an engineer of the Reclamation Service, and an assistant, by floating, swimming, and climbing for ten days succeeded in getting through and locating the site of the tunnel (page 27).

THE RECLAMATION FUND

The reclamation fund comes from the disposal of lands in thirteen states and three territories, and the amount is different widely in the different states. The law provides that so far as practicable the amount shall be spent in the state where it originates, but in fact the available funds are almost always inversely apportioned to the needs of any one state.

From Nevada, the state having the largest opportunity for development, the amount of money is represented by

a small amount, while from North Dakota there has come an enormous fund. In the latter state there is little possibility of development by irrigation because of the difficulty of finding irrigable lands and an adequate water supply. North Dakota and Oregon and Oklahoma have large funds. In Oklahoma, with its subhumid climate, there is little need of irrigation development,



Floating through Gunnison Channel, Using a Rubber Bed as a Raft (page 27)

and in fact it is almost impossible to find any reclamation project of considerable magnitude in that territory.

PRESENT RECLAMATION WORK

Examinations leading to construction are being carried on widely. At the points where dams may be erected for water storage the foundations must be studied, and for this purpose diamond drills are used to ascertain the character of the bed rock. Work of construction has been begun in two localities—one in Nevada and the other in Arizona. In Nevada the work in hand is that on a canal to take water from Truckee River into lower Carson reservoir site. Lake Tahoe, at the head of the Truckee River, is the highest large lake in the United States and in many respects is an ideal reservoir site, and its waters if wisely used will go far to promote the prosperity of Nevada.

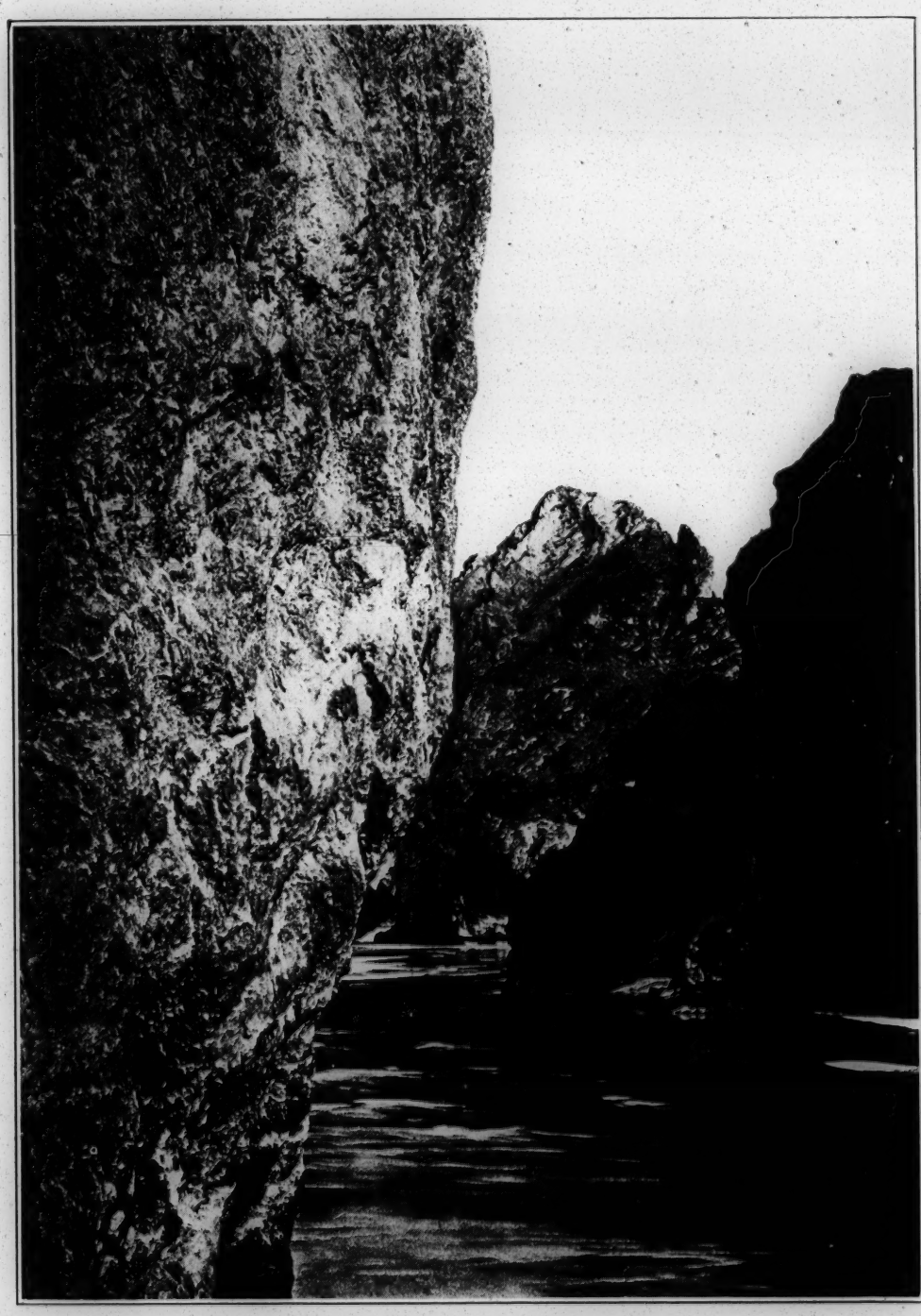
In California, over the state line from Nevada, are opportunities for water storage. In the mountains are little valleys in which water can be held. It is impossible for Nevada, as a state, to utilize these reservoir sites, as it cannot go across the state line. The national government is alone capable of doing this work.

A dam put across Carson River near its lower end will flood back the water and make an immense reservoir, capable of supplying several hundred thousand acres of land which is now absolutely desert and almost impossible to cross.

The interstate character of these problems of reclamation is exceedingly complicated. The Rio Grande, rising in Colorado and flowing through New Mexico, forms the boundary between Texas and Mexico; the Arkansas rises in Colorado and flows through Kansas, Oklahoma, Indian Territory, and Arkansas; the South Platte and North Platte flow from Wyoming into Nebraska; the head waters of the Colorado rise in Colorado, flow through Utah, and form the bound-

"We floated, paddled, and waded 400 miles down the stream, under the most delightful climate of the United States"

There are many square miles of rich bottom land along the Colorado River capable of high cultivation if reclaimed



Red Canyon of the Colorado River

Where the United States may build a great storage dam, similar to the great dams at Assiut and Assûan in Egypt

ary between Arizona and California. Nearly all the important rivers of the arid West rise either in Colorado or Wyoming, in the mountain ranges crossing these states, and flow out from these states, furnishing water for adjoining states. This interstate character of the streams has been held as one of the reasons for federal intervention in reclamation, as well as the fact of federal ownership of the vacant lands.

GUNNISON RIVER PROJECT

In Colorado the largest project now in construction is that of taking the Gunnison River into the Uncompahgre Valley. This river flows in a narrow canyon two thousand feet deep. This canyon has been regarded as impassable, but Mr A. L. Fellows, one of the engineers of the reclamation service, and an assistant went through in 1902 at the risk of their lives. The attempt had been made a number of times to go down it by boats, but without success. These men did it by means of swimming and by using a pneumatic mattress or rubber bed as a raft. They put in small rubber bags the necessary food and a little underwear. In ten days, by floating, swimming, and climbing, they succeeded in getting through and locating the point at which may be located the headworks to take the water out by a tunnel into Uncompahgre Valley.

The tunnel, heading in the steep cliffs, continues near the river for three or four miles in order to gain grade, and then passes through the mountain to the valley beyond. Careful surveys and examinations are being made, and it is believed to be feasible to build the tunnel, if enough irrigable land can be found to justify the undertaking.

Another project which has been under examination is that in southern Wyoming on the North Platte River, at what is known as the Devils Gate, on Sweetwater River, a short distance above the point where it enters North Platte River.

Unfortunately the amount of water available at this point is small, and after careful examination, there is now being considered another reservoir site at a lower point, where there is ample water for storage purposes. This is on North Platte River itself, below the mouth of Sweetwater River.

In northern Wyoming there is another reclamation project, that on Shoshone River, which here flows through a granite range. Surveys are being made to demonstrate the practicability of diverting this river and carrying it out to the broad plains of the Big Horn basin.

The Present Water Supply System of Phœnix, Arizona

There are thousands of acres of reclaimable land near Phœnix which are capable of producing sometimes seven crops a year.

THE COLORADO RIVER

One of the greatest works in the United States is the utilization of the great Colorado River of the West. The head waters come from Wyoming and Colorado, flow through Utah and northern Arizona, and the river finally enters the Gulf of California. Along this stream are lands capable of high cultivation, as the soil is rich and the climate semi-tropical.

The rank growth on the bottom lands shows that wherever water is found the vegetation is extremely dense. It is, in fact, almost impossible to push one's way through this vegetation. The illustration on page 25 shows some of the broad bottoms that can be reclaimed.

The river itself is constantly changing, shifting over a very broad extent of channel. Last Christmas I took a trip down the river in a boat, and we floated, paddled, and waded for four hundred miles down that stream, under the most delightful climate in the United States. It was a wonderfully delightful experience. We would be sailing under a good breeze, at an exhilarating rate, and everybody would be gay, when suddenly we would hang up on a mud bank; then all would go overboard. We would push off into deeper water, and then on until we brought up in another mud bank.

Page 26 shows where it will be possible to build dams similar to those built by the British engineers on the Nile. The river, although a quarter or a half a mile wide above, here becomes narrow, hardly wide enough for a steamer to pass, and at this point it would be possible to erect dams holding back the water. The great difficulty is the fact that the mud carried by the river would fill the reservoirs very rapidly.

THE SALT RIVER

Another project under consideration is in Arizona, on Salt River. This dam, if constructed, will be one of the greatest in the world, being 230 feet from foundation to top. The lands to be reclaimed along the Salt River are in the vicinity of Phœnix and are capable of a high degree of cultivation, producing crop after crop throughout the year. There are sometimes as many as seven crops a year raised.

In southern Idaho are vast tracts of desert land, to which water may be brought from Snake River. At the head of this river is Jackson Lake, situated at the foot of the Grand Tetons. By closing the outlet of this lake all the water can be held, storing a sufficient supply for tens of thousands of acres along Snake River, in Idaho.

Under present conditions the water supply in Snake River dwindles to such an extent that during the summer the channel is dry at points along its course. This river, which appears to be inexhaustible, is as a matter of fact nearly dry at points in eastern Idaho for several months when the water is most needed.

A great project under consideration is is that of taking water out of some of the tributaries of the Columbia. Millions of acres susceptible of irrigation are below the level of the headwaters of Columbia River, but in order to convey these waters to the dry lands it is necessary to traverse mile after mile of steep side slopes. The cost of the project runs up into the millions of dollars; so that while the government may execute it in the future, the project of reclaiming the great arid lands of the State of Washington is one which is almost impossible for the present time.

In the region of the Black Hills of South Dakota and Wyoming are numerous small projects. Many streams flow outwardly from the hills through narrow canyons. By closing these gaps it is possible to hold water in various places around the Black Hills. Beyond are vast stretches of rolling country

susceptible of reclamation. In the northern part of the region is one of the largest and best bodies of public lands to which it is practicable to take water. Here on Belle Fourche River are many thousand acres of public land which may be irrigated.

The theory of reclamation is to conserve the flood waters that otherwise go to waste and hold them until such time as they are needed. There is still a vast extent of arid lands to which the flood waters can be carried and which, when watered, is capable of producing large crops and furnishing homes for prosperous farmers.

General George M. Sternberg: I would like to ask whether, in case a channel is opened and water brought across from Canada, under international law Canada would have any claim against us for taking away her water supply.

Mr Newell: It would open up the great question of water law, and I would say in response that the principle has been established that priority of appropriation gives priority of right. The man who first takes water and puts it to beneficial use, provided he complies with certain requirements, is entitled to it. In the East, if you have a stream flowing through your farm; even though you do not use it, you are entitled to have that water go through your farm, but in the western states, if you take the water and put it to beneficial use, you can continue to do so, but if you do not, any one who can put it to good use is allowed to do so The development of the arid country would be absolutely impossible if it were necessary for the waters to flow down undiminished in quantity and quality as in the eastern states.

Acting President W J McGee: The chair is confident that the members of the Society would be glad to hear from several persons present who could speak from experience on the great problem. The Director of the Geological Survey, under whose responsibility the work has been conducted, is with us. There are others with us who have been acquainted with the practical aspect and also the theoretical aspect of irrigation for many years.

Hon. Charles D. Walcott: I think Mr Newell has given a very clear idea of the irrigation law and its operation. I will say that when the question came up in 1894, when I took charge of the Survey, of renewing the work, I asked Major Powell who was the best man to do it. He says, "We have a man named Newell, who is now in the West: Send for him, and if started with him, I think it will go on well."

After the irrigation law passed, the Secretary of the Interior and the President asked who was the man to place it in charge of. I told them that I knew of no one so well qualified by training and experience and other qualifications as Mr Newell. He said tonight I am responsible to the Secretary of the Interior. Mr Newell has charge of that work, and I hold him responsible, and I am simply one who will help him as far as I can, but the responsibility of the work and carrying it on rests upon his shoulders.

Mr Newell: One of the gentlemen who fought for the bill on the floor of the House is here, and I would ask that we may hear from Mr Mondell, of Wyoming. He was in charge of the reclamation bill at the time of its passage in the House of Representaves.

Hon. F. M. Mondell, Representative from Wyoming and chairman of the Committee on Irrigation of the House of Representatives: I have been very much interested indeed in Mr Newell's lecture and these beautiful and instructive views he has thrown upon the screen. We of the West are vastly interested in the irrigation work of the national government. I have worked in Congress and out of Congress for a good many years to accomplish the passage of a law which I am pleased to know the gentlemen of the Reclamation Service are finding to be a law comprehensive enough to cover practically all the conditions which exist in the western countries.

Irrigation in America is not a new thing by any means. The Indians practiced it many hundreds of years ago in the Southwest, the Spaniards later, the Americans again in the forties, and private enterprise has moved along a good many ways in the development of the smaller projects of irrigation throughout the arid regions. But there are many large tracts beyond the possibility of development by private enterprise, where there are many complications by reason of the rivers flowing through two or more states, as Mr Newell has said this evening, and enterprises costing so much, irrigating such vast amounts of land that it seemed necessary that these works should be taken up by the federal government. The agitation, taken up many years ago for the undertaking of the work by the national government, resulted finally in the passage of the irrigation bill.

We are exceedingly fortunate that the administration of the law has fallen in good hands—exceedingly fortunate. The people of the West have great confidence in the Director of the Geological Survey and in Mr Newell and the most efficient corps of engineers which has been organized under his direction. The work is starting most auspiciously. It is true that

our people do at times become a little insistent that the work shall be immediately inaugurated in each and every one of the sixteen states and territories embraced within the provisions of the law, but, in the main, they are very well satisfied with the development that has been made. Rapid progress has been made in engineering and in the general work of looking over the projects in all of the states and territories interested and we are hopeful that within a very few years a vast extent of territory in the western country will be developed by means of the national irrigation law and under the administration of Mr Newell and Mr Walcott.

Acting President McGee: The chair would like to call attention to the fact that in addition to the gentlemen who have been mentioned as competent and far-sighted public officers, competent thoroughly to deal with the greatest engineering project that has ever been undertaken, an enterprise which includes not only engineering, but also the development of ideas and new theories in matters of law, the fact that there are still other citizens of the country who have done most effective work in this great reclamation service. One of our statesmen, one of the most active and energetic among the workers for the law recently enacted, has spoken to us. There are many others, and among these we must not forget the vigorous Chief Magistrate of the land, who has for the whole of his administration been one of the most earnest and successful advocates of this new law which gives the people of the United States a new outlook for the powers and resources of nature.

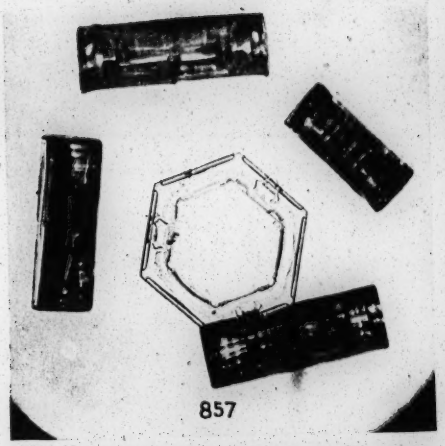
SNOW CRYSTALS

THE wonderfully beautiful and intricate designs of snow crystals have long excited admiration. Various students have made detailed investigations of their extraordinary form and have published drawings of what they look like when magnified, but the most remarkable collection of actual photographs of these crystals (technically, photomicrographs) is in the possession of Mr Wilson A. Bentley, of Jericho, Vermont. Mr Bentley has been making a special study of snow crystals during 20 years. He has photographed many hundreds of them, and has now in his collection more than 1,000 photomicrographs, no two of which are alike. In the Monthly Weather Review he recently published an exhaustive account of the results of his investigations. To this report the NATIONAL GEOGRAPHIC MAGAZINE is indebted for the following facts and also for the beautiful illustrations of snow crystals which accompany this article.*

* "Studies among the Snow Crystals during the winter of 1901–'2, with additional data collected during previous winters." With 300 illustrations of Snow Crystals. By Wilson A. Bentley. Annual summary of the *Monthly Weather Review* for 1902. Vol. 30, No. 13.

Snow crystals are divided into two great classes: those *columnar* in form, No. 857, and those of a *tabular* form, No. 716. These two fundamental types are in turn divided into many subvarieties. No. 709, possessing a solid tabular nucleus surrounded by more or less open structure, is called *stellar*, while No. 920, which has an open central nucleus and resembles a fern, is called *fern stellar;* No. 746 is of a solid tabular form, named *lamellar;* No. 580 consists of columnar forms connecting solid tabular nuclei, and are called *doublets*. The extremely long needleshaped forms of No. 700 are designated as *needleshaped* or *needilar*. Crystals with granular coatings, as 807, are called *granular*. These are the most common form; then come the fern-stellar, 920, the stellar, 709, and the solid tabular, 746, while the columnar, 857, the needleshaped, 700, and lastly the doublets, 580, are the most rare types.

The forms vary according to the wind, the height of the clouds, the degree of cold, the amount of water in the air, etc. Crystals formed in cold weather or in high clouds are usually columnar, No. 857, or solid tabular, No. 850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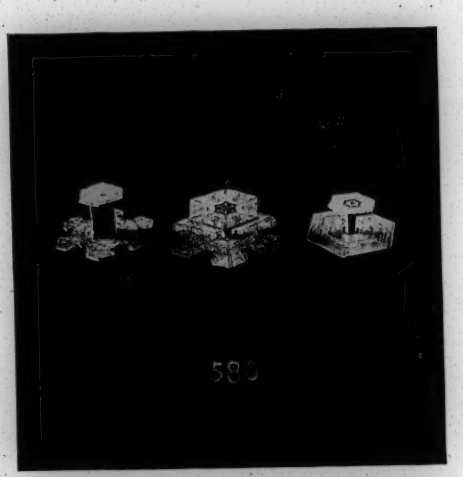
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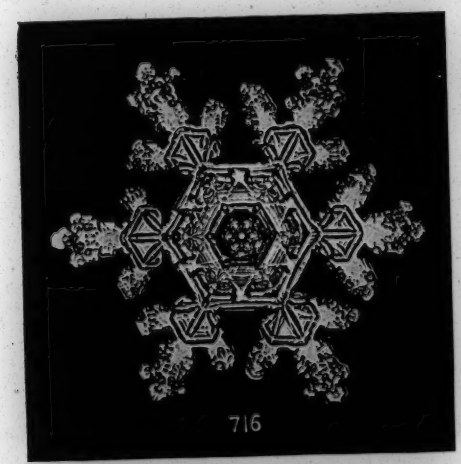
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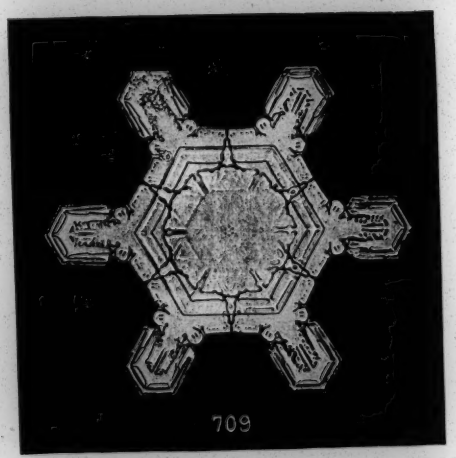
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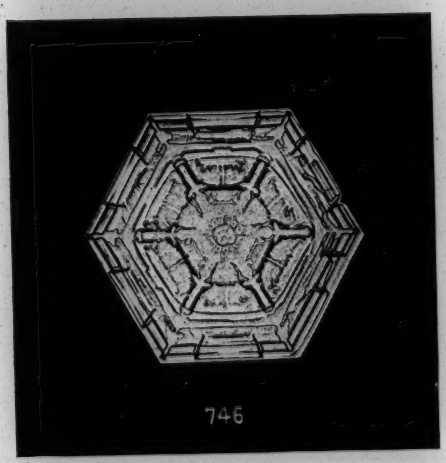
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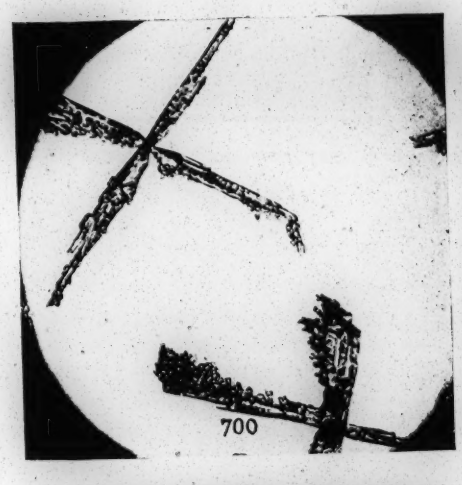
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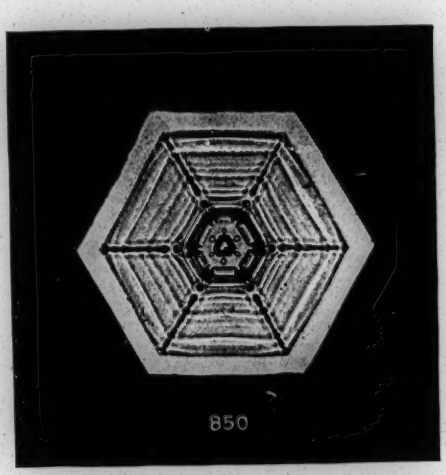
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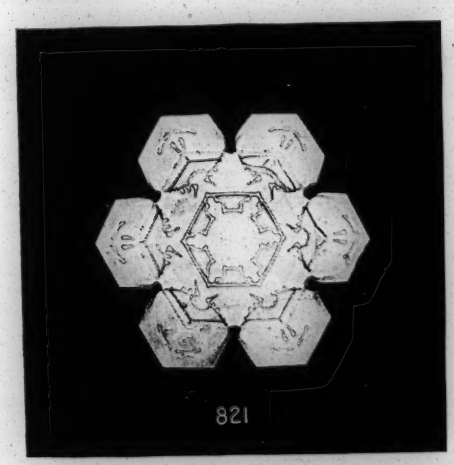
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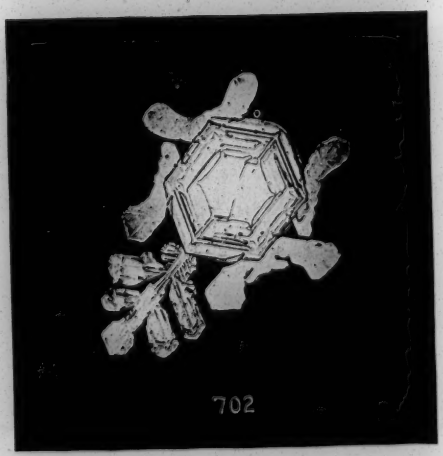

702

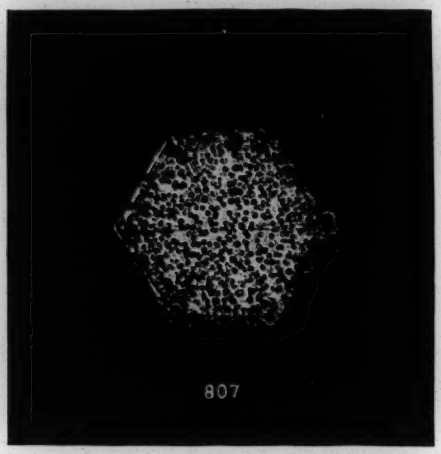
Those formed in moderate weather and light winds or in low clouds are apt to have frail branches and to be of a feathery type, No. 920; mixed forms, Nos. 821 and 831, grew partly in low and partly in high clouds. High winds give broken and irregular forms, and much moisture the very granular crystals, No. 807.

These heavy granular-covered crystals are peculiarly a product of the lower or intermediate cloud strata, and especially of moist snow storms. In intense cold they are rare, while the columnar and solid tabular then become common.

About four-fifths of the perfect forms occur within the west and north quadrants of great storms.

The most common forms outlined within the nuclear or central portions of the crystals are a simple star of six rays, a solid hexagon, and a circle. The subsequent additions assume a bewildering variety of shapes, each of which usually differs widely from the one that preceded it and from the primitive nuclear form at its center.

By bearing in mind the fact that crystals evolved within the upper clouds tend toward solidity, and the crystals formed in lower clouds tend toward open branches and feathery forms, it is possible to trace the history and travels of a great many of the crystals. No. 821 was probably star-shaped at birth and was formed in low clouds. Ascending air currents carried it upward until it reached a considerable height, where it assumed the solid hexagonal form which we see outlined around the star-shaped nucleus. Its greater weight now caused it to descend to lower levels, where it acquired still further growth. No. 831 originated at a high altitude, then descended, and completed its growth entirely at low levels. No. 850 originated in and was also completed in the upper clouds. No. 920 was born and matured entirely in lower clouds. No. 565 was probably formed on a long broken branch

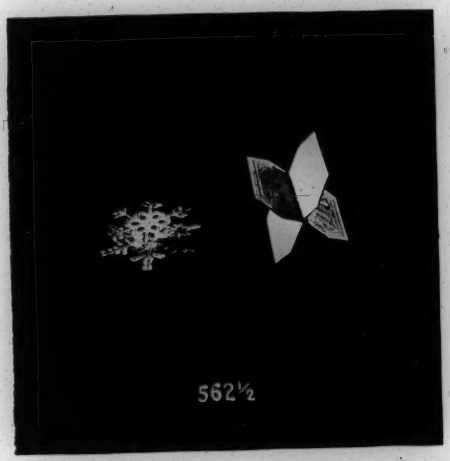

807

Columnar forms like 857 or solid tabular, 746, are naturally heavier than the open forms; they are not therefore likely to be wafted about in so many directions and hence to be modified and become so intricate as the light, feathery crystals.

No. 702 is one of the oddest and most remarkable crystals ever photographed. By some extraordinary combination of circumstances, during the latter stages of its growth the aqueous material of which it was built was apparently brought to it from one direction only.

The perfect symmetry of Nos. 785 and 792 greatly resembles, in ideal perfection, the beautiful drawings of the English observers Scoresby and Glaisher, and leads us to think that, contrary to the conclusions reached by some recent observers, such drawings may be quite true to nature and more reliable than we have been led to suppose.

No. 785 is considered by the author the peer of any in his whole collection; No. 735, a beautiful starfish design, is a somewhat rare form. Prof. S. Squinabol, of the University of Padua, made drawings of a snow crystal found in Genoa in 1887 that closely resembles this form. Mr Bentley does not attempt to explain the delicate, beautiful, and unique central details of No. 779.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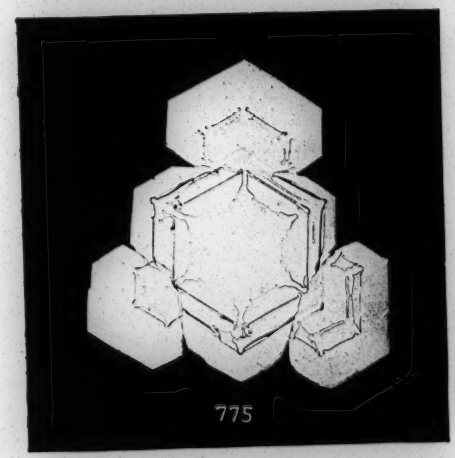
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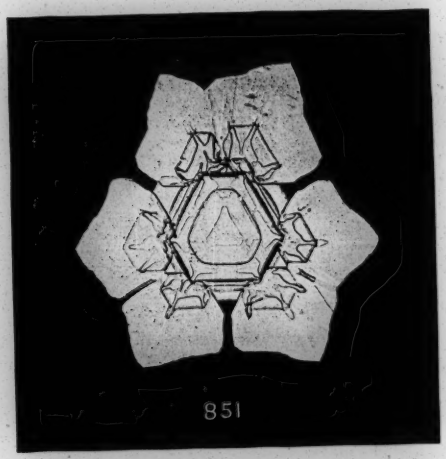
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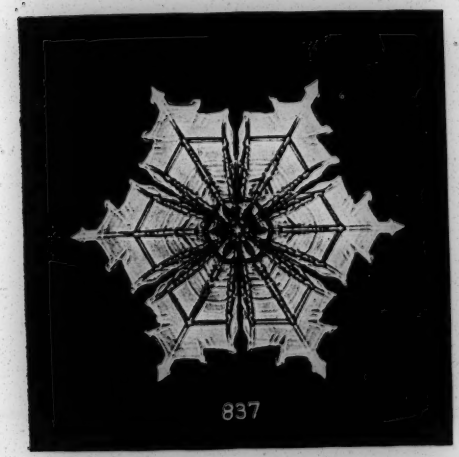
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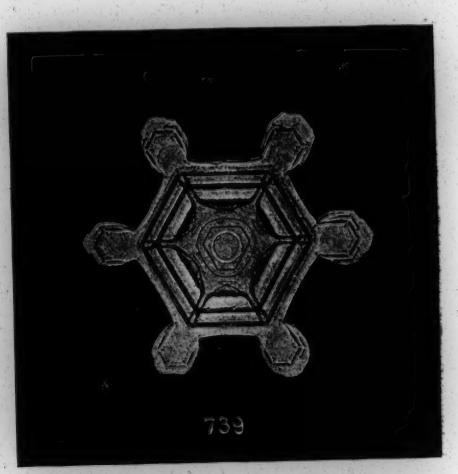
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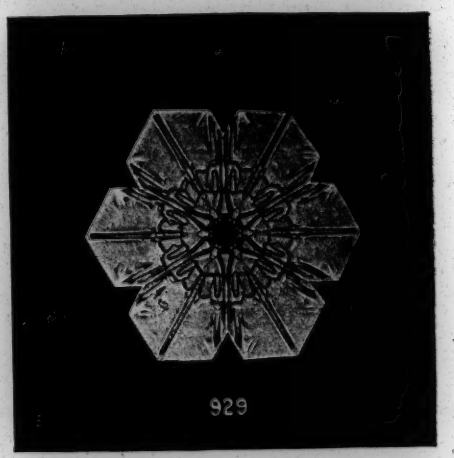
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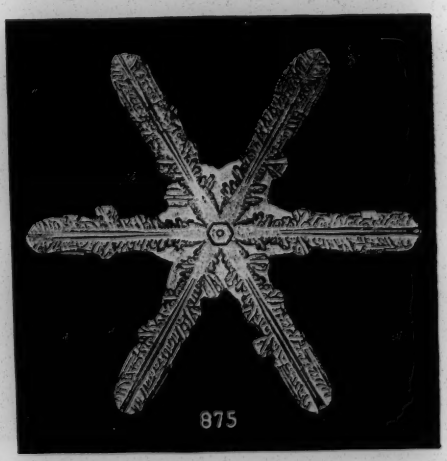

875

Perfect crystals are frequently covered over and lines of beauty obliterated by such granular coatings as are shown in 807. Such heavy granular-covered crystals possess great interest for many reasons: They show when the character of the snow is due to the aggregation of relatively coarse cloud particles or minute rain drops, and not to the aggregation of the much smaller molecules of water presumably floating freely about between them. They also offer a complete explanation of the formation and growth of the very large rain drops that often fall from thunder clouds and other rain storms, if we accept the conclusion that such large drops result from the melting or merging together of one or more of the large granular crystals.

While most granular forms possess true crystallic nuclei, there is reason to suppose that they sometimes form directly from the particles of cloud or mist.

HOW THE DESIGNS ORIGINATE

The beautiful details, the lines, rods, flowery geometrical tracings, and delicate symmetrically arranged shadings to be found within the interior portions of most of the more compact tabular crystals, and in less degree within the more open ones, are due to minute inclusions of air. This included air prevents a complete joining of the water molecules; the walls of the resultant air tubes cause the absorption and refraction of a part of the rays of light entering the crystal; hence those portions appear darker by transmitted light than do the other portions. The softer and broader interior shadings may perhaps also be due, in whole or in part, to the same cause, but if so, the corresponding inclusions of air must necessarily be much more attenuated and more widely diffused than in the former cases. We can only conjecture as to the manner in which these minute air tubes and blisters are formed.

As no one can ever actually see the extremely minute water particles rush together and form themselves into snow crystals, the material and the manner in which the molecules of water are joined to form snow crystals is largely a matter of speculation. While it is true that the snow crystals form within the clouds, it does not therefore follow that they are formed from the coarse particles of which the clouds are composed in cold weather.

We have good grounds for assuming that the true snow crystals are formed directly from the minute invisible atoms or molecules of water in the air, and not from the coarse particles in the clouds, as it is unlikely that these coarse particles could unite into snow crystals in so perfect a manner as to leave no trace of their union even when examined under powerful microscopes.

THE U. S. WEATHER BUREAU*

BY HON. JAMES WILSON, SECRETARY OF AGRICULTURE

THE year 1902–'03 marks a distinct advance by the Weather Bureau in the science of meteorology, especially in two directions. From the beginning of the weather forecasts of the government, in 1871, the necessary observations at the several stations have always been reduced to the sea-level plane. It was conceived some years ago that the numerous defects in

* From the Report of the Secretary of Agriculture, Hon. James Wilson, for 1903.

forecasting might be diminished, and the uncertainty as to the true cause of storms removed, if similar daily charts were also constructed at higher levels, for which purpose the 3,500-foot and the 10,000-foot planes were selected. After much laborious computation, as shown in the barometry report of 1900–1901, the necessary reductions were made, and we now possess daily weather charts on the three planes mentioned. The study of these supplementary maps is going on, with encouraging prospects of more reliable forecasts of the weather conditions, and it is hoped by January 1, 1904, to make them a part of the regular daily work of the forecasting service. At present the improved data are confined to the barometric pressures, but it is most important to secure charts of the temperature on the two upper planes as well. Unfortunately, we have no observations of temperature in the higher atmosphere suitable for this purpose, and they can be secured only by means of numerous balloon and kite ascensions carrying the necessary self-registering instruments.

MOUNT WEATHER

It has been thought proper for many reasons to establish on the Blue Ridge Mountains, at Mount Weather, Bluemont, Va., a modern meteorological observatory of the best class for scientific research pertaining to problems of weather phenomena. A building for administration and for a school of instruction is being erected, and the plans are well advanced for a suitable power-house and shop for balloon and kite ascensions, which will be built during the coming year. The recent advances in solar and terrestrial meteorology justify us in preparing to study at first hand the variations in the solar activity, and the corresponding changes in the weather conditions, especially from season to season. It is a complex problem and will require the best instrumental equipment, the ablest students, and a long series of observations before it can be finally solved.

The desirability of being able to foresee a year in advance the type of season probable during a given period is so great as to make it imperative to lay broad scientific foundations at the beginning of the twentieth century, which will be of utility for future generations, who will surely build a great science of cosmical meteorology upon such data as can be supplied by the Mount Weather Observatory.

New submarine cables in connection with the vessel-reporting and storm-warning services have been laid from Sand Key to Key West, Fla.; from Southeast Farallone to Point Reyes, Cal.; from Block Island to Narragansett Pier, R. I., and from Glen Haven to South Manitou Island, Mich., a total of about 50 miles. Additional vessel-reporting stations have been established at Sand Key, Fla., and Southeast Farallone, Cal.

To meet the demands of the maritime and commercial interests of the Pacific coast a cable has been laid between San Francisco and the Farallone Islands, with a weather observatory and vessel-reporting station on the South Farallone Island. A wireless station has also been installed there to insure communication in future should the cable be out of order.

RIVER AND FLOOD SERVICE

The work of the river and flood service, owing to the numerous and disastrous floods that occurred, has been a prominent feature of the year. Several of the floods were the greatest of which there is authentic record, and were remarkable both for their wide extent and for their destructive character. Our warnings were prompt and timely, and in the main remarkably accurate, and in no instance was the coming of a dangerous flood unheralded. The forecasts

of the great floods of March, April, and June, 1903, afford noteworthy examples of the efficiency of this service. This should be extended to the Kansas and other rivers, where no stations have yet been established.

DISTRIBUTION OF FORECASTS AND SPECIAL WARNINGS

Inadequate appropriations have prevented any extensions in the important work of distributing forecasts and special warnings, and of necessity our efforts have been confined to maintaining the service already in operation, with its various ramifications, and adopting such suggested improvements as might be effected without additional expense.

A marked increase (nearly 20,000) is shown in the number of places receiving forecasts by telephone without expense to the Government of the United States, and with the rapid extension of "farmers' telephone lines" opportunity is afforded for placing weather information directly in the homes of the more progressive agriculturists, as well as in the telephone exchanges of rural centers of population, where it is posted for the general information of the public.

The National Climate and Crop Bulletin has been issued in the usual form, with charts showing the current temperature and precipitation, extremes of temperatures, and the departures from the normal of both temperature and precipitation. In this bulletin the current meteorological conditions are discussed in their relation to crop growth from the beginning to the end of the crop season.

EDUCATIONAL WORK

The Weather Bureau has, through its officials at the various stations throughout the country, taken an active part in public education along meteorological lines. In 12 colleges or universities during the past year Weather Bureau officials have conducted regular courses of lectures or classes of instruction in meteorology and climatology, and at 5 of these institutions the official is a member of the faculty. At 16 stations the officials have delivered occasional addresses outside of their offices to schools or colleges, and at 28 stations they have given frequent talks in their offices to pupils and teachers of schools. In 14 instances they have delivered occasional addresses outside of their offices to farmers' institutes and similar organizations. Only a few years ago there was very little instruction of this nature given in our colleges, universities, or public schools, but the demand for it has rapidly increased. The action of the Bureau in this direction will undoubtedly result in a wider knowledge and a more intelligent understanding of its work, and a consequent increase in its usefulness and value. Many of the young men who receive instruction in these classes are attracted to the service of the Bureau as an occupation, and the Bureau profits by securing a class of employés with special training and equipment.

Cotton for England—The desperate efforts England is making to grow cotton in her colonies in Africa, India, Ceylon, and Australia are described at length by the United States consul to Liverpool, James Boyle (Consular Reports, November 20, 1903, No. 1806). The recent cornering of American cotton has caused great distress in England and has made English cotton manufacturers acutely realize what will happen to them in a few years when the United States uses all the American crop. Their only hope is the possibility of the British colonies being able to supply them with cotton.

MARCUS BAKER

SEPTEMBER 23, 1849–DECEMBER 12, 1903

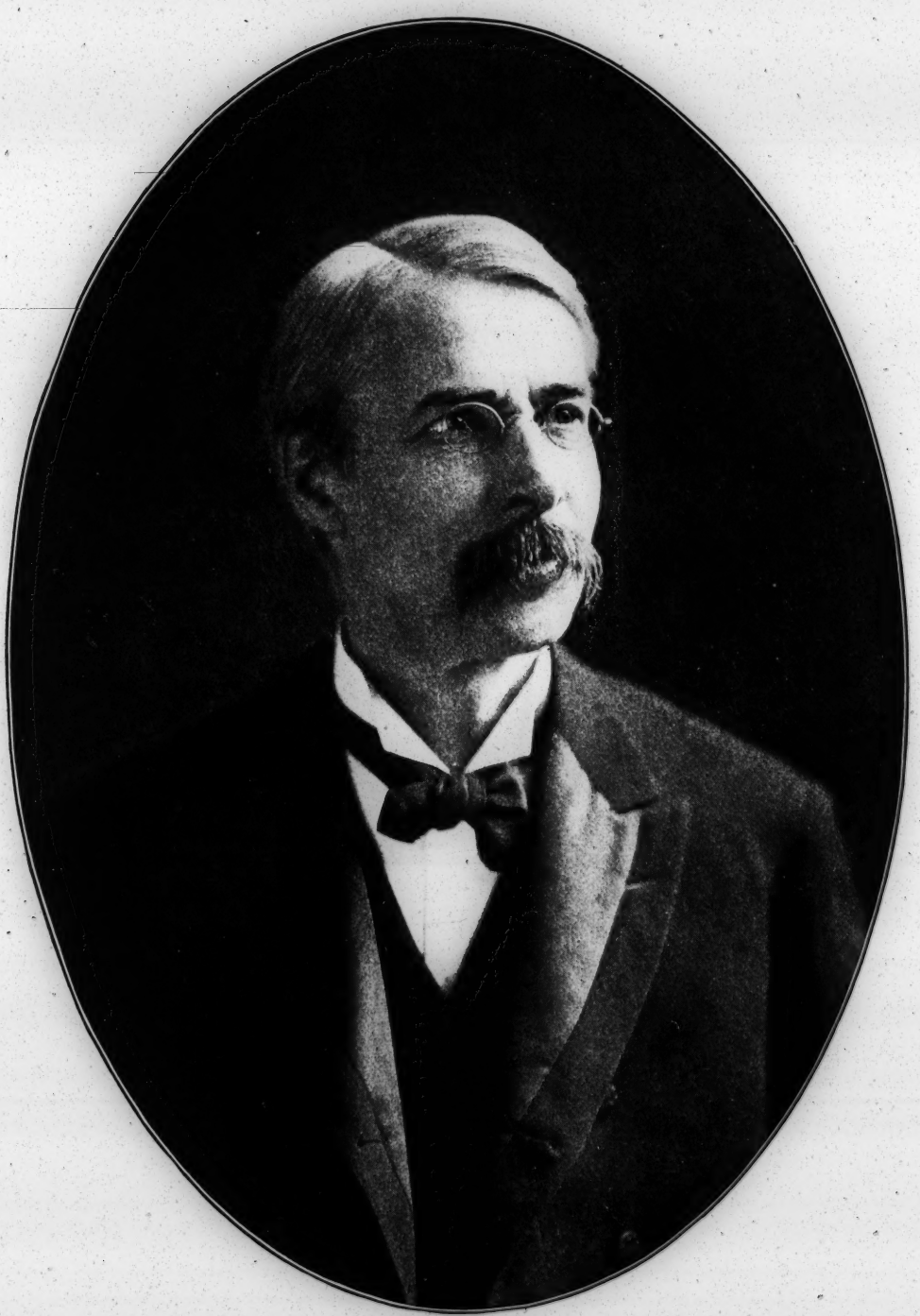
On Saturday morning, December 12, Mr Marcus Baker died very suddenly of heart failure at his residence in Washington. Mr Baker was one of the fifteen original signers of the certificate of incorporation of the National Geographic Society, January 27, 1888. He was elected a member of the Board of Managers at the first meeting of the Society and has served continuously on the Board ever since. He was a member of the Executive Committee of the Board and had for many years been chairman of the Committee on Admissions. He had given freely to the Society of his time and energy, and his exceeding good judgment had greatly helped to mould and guide the policies and purposes of the Society during the sixteen years of its history. He has left a vacancy on the Board of Managers and in the Society which it will be impossible to fill.

At a meeting of the National Geographic Society December 18, addresses in memory of Mr Baker were made by Dr Wm. H. Dall, who has known Mr Baker since he began his eminent career as a geographer in 1873, and by Dr L. A. Bauer. Dr Bauer paid a tribute to the important contributions to magnetic science by Mr Baker while Director of the U. S. Coast and Geodetic Survey Magnetic Observatory at Los Angeles. Dr Dall's address is published below:

In 1871 I undertook a geographical reconnaissance of the Aleutian region of Alaska for the U. S. Coast and Geodetic Survey. Our first season's work extended from August, 1871, to October, 1872, and on our return to San Francisco my associate, M. W. Harrington, astronomer and mathematician of the party, returned to the East. During the thirteen months we had spent on our little 75-ton surveying cutter, we had received two batches of mail. Chicago was burned, the six weeks' war on the continent took place, and we knew nothing of it for six months. Our work was carried on in a small sailing vessel. The region was practically uncharted, the existing charts known to be most imperfect, the unsurveyed waters bristling with reefs and shoals, the region one of the foggiest and most tempestuous in any ocean. We had to purchase and rebuild for our work a new vessel, guided by the fierce experiences endured in the old one. The country at that time was generally regarded as a wilderness of ice and fog. No man was likely to volunteer for work in such a region and under such conditions unless he was possessed of an adventurous spirit and a genuine interest in his work.

From the University of Michigan came a young man whose first glimpse of the ocean was through the Golden Gate. His kindly and cheerful nature and lively enthusiasm captured our affections at the start. Thoroughly based in mathematics and with a working knowledge of field astronomy, he soon mastered the difficulties of the transition from theory to practice. Penned for nine months of the year in a little cabin, elbow to elbow, one soon comes to know the inmost qualities of one's associates. There began an intimacy which was only broken by death.

Our work was very different from the ordinary surveying in an average climate. The stars were invisible a great part of the summer, owing to the high latitude. The sun was almost constantly veiled in fog or mist, and one had to take advantage of every gleam



Marcus Baker

of sunshine to obtain the most simple and necessary observations for time, latitude, and azimuth. Often with instruments set up and covered with oiled canvas we have waited hours under an umbrella in the persistent drizzle in the hope that the sun might give us five minutes free of clouds. There were no limits to our day's work, except those set by the climate and its caprices. Through three years of such experience Mr Baker was ever cheery, ever full of expedients to circumvent the perversities of the meteorological environment, and the fair measure of success we met with was largely due to him.

On our return to civilization began the task of utilizing the material obtained, by preparing it for the use of navigators in the form of charts, meteorological and tidal tables, and a Coast Pilot. Owing to the little-known character of the country the importance of bringing together the information scattered through scores of voyages, atlases, and charts was very marked. I had planned a series of such summaries: the Coast Pilot for the details of navigation, the meteorology, the observations of terrestrial magnetism, and a bibliography of charts, maps, and publications.

In all the work which this involved Mr Baker was my efficient helper. The collection and the reduction of still unpublished terrestrial magnetic observations, dating from 1740 to 1880, was almost wholly his work, and from this manuscript Mr Schott derived nearly all of the data for Alaska which he utilized in his important series of papers on the variation in the amount of declination of the magnetic needle during long periods of years. Early in the prosecution of our work I had noticed that the culmination of easterly variation for the nineteenth century in the Aleutian region had passed, and to Mr Baker was given the task of making the numerous local observations by which this important fact might be placed on an irrefragable foundation.

These labors on magnetism, bibliography, the comparisons of charts in their historical relation, and the synonymy of geographic names, which were involved in the work we did together, have always seemed to me a direct preparation for the important geographic work he accomplished later.

Our work in Alaska being interrupted, Mr Baker was placed in charge of one of the Coast Survey primary magnetic stations, with self-registering instruments, at Los Angeles, California—a work of the results of which I can only say that experts in magnetism pronounced it admirable. In 1885 he returned to Washington, where he transferred his labors to the U. S. Geological Survey, where they were chiefly geographic and concerned with the topographic and other charts issued by the Survey. He also became one of the most serviceable members of the Board of Geographic Names, formed by President Harrison to regulate the nomenclature of official publications. During a large part of his service here he was closely intimate with the late Director of the Survey, Major Powell, who warmly appreciated his qualities.

When the Venezuela controversy arose and a skilled geographer was needed, Mr Baker was called on, and the fine historical atlas he compiled and the volumes he saw through the press while in the service of the commission would alone form a worthy monument to any geographer.

Returning to the Survey, he busied himself largely in the preparation of a work on the synonymy and history of the geographic names of Alaska, entitled "A Geographic Dictionary of Alaska," which was issued as Geological Survey Bulletin No. 187 in 1902. The immense labor involved in this work and its usefulness to the cartographer and geographer make it of exceptional importance.

With his services to and interest in this Society you are all familiar, and no

one who has known him could be ignorant of his peculiarly lovable personality. I have touched in these remarks merely on the geographic side of his work and interests. While his recent transfer to the Assistant Secretaryship of the Carnegie Institution in a sense separated him from purely geographic matters, I cannot doubt that had his life been spared to round out the normal tale of days allotted by the Psalmist he would have continued to give us worthy contributions to the most inclusive of sciences until the very end. As it is, his contributions have been noteworthy, and will form, in the eyes of future students, an imperishable monument of our departed associate and friend.

CONTROLLING SAND DUNES IN THE UNITED STATES AND EUROPE*

By A. S. Hitchcock,

Assistant Agrostologist, U. S. Department of Agriculture

In many parts of the United States there are areas of drifting sand which are of much economic importance from the fact that they not only are useless for agricultural purposes, but may seriously encroach upon valuable property. These areas, known as sand dunes, consist of hills of sand which, when bare of vegetation, readily shift from place to place when acted upon by the wind, and are then called wandering or shifting dunes. Such dunes occur along sandy shores of the ocean, of the Great Lakes, or even along our large rivers, notably the Columbia River in Washington and Oregon. These dunes are formed from the sand which is washed up during the tides, storms, or high water in case of rivers. The sand soon dries, s blown in the direction of the prevailing winds, and forms drifts in the same manner as snow. The drifts may attain the size of hills, in some cases as much as 200 feet in height. Continuous winds blow the sand over the brow, and the whole dune thus moves slowly but irresistibly forward, covering whatever is in its track—fields, forests, ponds, rivers, buildings. The direction of the prevailing winds determines whether dunes will be formed along a sandy coast. On Lake Michi-

Sand Dune Overwhelming a Forest, Cape Henry, Virginia

The dune is moving slowly northward, burying the forest as it goes

*An address to the National Geographic Society, November 20, 1903.

Sand Dune Overwhelming a House at Manistee, Mich.

This dune, originally stationary some distance away and covered with grass, was converted into a shifting dune a few years ago by a party of townspeople celebrating a political victory upon its brow with bonfires, thus destroying the grass. A blowout was formed, and, no repairs being made, this gradually enlarged until the whole hill began to advance The dune advanced eastward and soon threatened the city water-works and other property. This dune has now been controlled by beach grass and brush.

gan dunes are found at various places along the south and east shore, but none along the west shore. It is interesting to note that the dunes in this region are probably the largest and highest to be found on the continent, and are scarcely exceeded by any in Europe.

In nature, sand dunes are not formed where the conditions will allow a covering of vegetation; consequently they are not found in warm regions or only exceptionally, as the long vegetative season allows opportunity for a covering to become established; but in northern regions, where vegetation lies dormant for a considerable portion of the year, the severe winter storms may prevent such a covering from forming.

The chief areas of shifting dunes to be found along the Atlantic coast are on Cape Cod, in the vicinity of Provincetown; southern New Jersey, near Avalon and Stone Harbor; Cape Henlopen, near Lewes, Delaware; Cape Henry, Virginia, and less extensive, though quite troublesome, dunes at Currituck, North Carolina; Isle of Palms, near Charleston, South Carolina; and Tybee Island, near Savannah, Georgia.

Sand dunes occur at various places along the Pacific coast, as Ventura, Monterey, and Mendocino counties, California, and the coast of Oregon. The latter are minimized by the moist climate. Extensive and exceedingly troublesome dunes are found along the Columbia River in Oregon and Washington from The Dalles to Riparia. The sand is brought down during the floods and blown about during the long dry summers. Here the conditions as to rain-

Sand Dune Encroaching on Railroad, Near The Dalles, Oreg.

The sand is deposited during the highwater of the Columbia River and then blown eastward, in many places crossing the tracks of the O. R. and N. Ry. The fences are intended to carry the sand parallel to instead of upon the track. However, these fences do not entirely prevent the evil, and the sand must be removed from the tracks daily. Similar conditions exist in many places along the railroad from The Dalles to Riparia, Wash.

fall are reversed, the rain coming in the winter and the dunes forming during the dry summer.

More or less successful efforts have been made at various times to "fix" the dunes and thus prevent the serious injury which they cause to valuable property.

In order to attack these problems more intelligently, the writer was sent by the Department of Agriculture to investigate the methods used in Europe, where work of this character has engaged the attention of the various governments for 50 years or more, and where the efforts in fixation or reclamation have been more successful than anywhere else in the world.

For this purpose typical dune areas in Holland, Denmark, Prussia, and France were visited. In all cases the reclamation is carried on by the general government, sometimes assisted by the local government, as private individuals are unable to bring to bear upon the problem sufficient means or continuity of purpose.

The fundamental principle of dune fixation is to cover the sand with a layer of any material which will prevent the access of the wind to the surface and thus prevent drifting. The kind of cov-

Sand Dunes Controlled by a Covering of Sand Hedges, on the Kurische Nehrung, Northeastern Prussia

ering used depends upon climatic conditions and the availability and cost of material. The aim is, when possible, to produce a forest, as this is permanent, and, moreover, if properly managed, yields an income. However, a forest can not be produced with certainty upon a surface of drifting sand, and it is therefore necessary to temporarily fix the sand in some other manner. Although any covering of inert material, such as chips, gravel, brush, etc., would answer the purpose, economic factors have reduced the preliminary methods of fixation to these: (1) transplanting beach grass; (2) covering with heather; (3) covering with a network of sand hedges.

(1) Many plants have been tried, but the most satisfactory is beach grass (*Ammophila arenaria* Link). This grass grows naturally upon the sand dunes of the north Atlantic coast of Europe as far south as Morocco, and of America as far south as North Carolina, and also along our Great Lakes. This is the grass which was used in reclaiming the land which is now Golden Gate Park in San Francisco. It has also been imported at various other points along the Pacific coast. To fix the sand the grass is transplanted in spring or fall and set two or three feet apart in the sand. The blowing sand is caught and held by the grass, but it has the power to grow up through the accumulated sand, and thus, with care to replant where necessary, it becomes a permanent covering. As a forest can not be established close to the ocean, a strip a few rods wide must be permanently fixed in this manner.

(2) In localities where heather is abundant this is cut with brush scythes and laid upon the surface of the sand. It is held in place by a little sand thrown over the edge of each layer.

(3) Where neither beach grass nor heather is available, or where the conditions are especially severe, sand hedges are used. These consist of rows of cut brush or stakes or of cut reeds, which are inserted in the sand in rows or quadrangles, allowing the upper end to project for six inches or more.

After the sand is temporarily fixed by one of these methods young trees, usually conifers, are transplanted, and the forest soon removes all danger of further shifting. In southwestern France the forest was established by sowing the seed of *Pinus maritima* upon the sand and covering with brush, but this method has not been successful in northern Europe. In France, and also the Kurische Nehrung, in Prussia, it has been found necessary to form artificially a long barrier dune between the ocean and the forest which protects the latter. This barrier dune is fixed by means of beach grass, but requires constant oversight to keep it in order. During severe storms dangerous breaches are formed, which, if neglected, would soon destroy the dune and seriously injure the forest in its lee. These breaks are mended by sand fences such as already described, but taller, which rapidly accumulate the sand until the hole is filled.

The trees used in northern Europe are chiefly *Pinus montana*, *P. laricio*, *P. austriaca*, and *P. sylvestris*.

TIMBERLINES

By Israel C. Russell, of the University of Michigan

In the February number, 1903, of the National Geographic Magazine I proposed the terms *cold timberline*, *dry timberline*, and *wet timberline* by which to designate respectively the three principal boundaries of forests. To this nomenclature Dr C. Hart Merriam records a protest in the March number of the same publication.

The principal objection advanced by Dr Merriam is the time-honored use of the word timberline as a name for the upper limit of tree growth on mountains. To employ the word in any other connection, as he states, deprives it of "its fixed and definite value." He also directs attention to the fact that the lower limit of tree growth in arid regions, or what I have termed the dry timberline, is in certain instances determined by temperature and not by lack of humidity.

During the past summer I made an extended journey in Oregon, where both the upper and lower limits of the forests are well defined, and was enabled to test the nomenclature referred to in a typical region. On account of this added experience, but fully appreciating the value of the criticisms advanced by a leader in a science closely related to physiography, I take this opportunity to explain, perhaps more fully than in my previous communication, my reasons for claiming recognition for more than one timberline.

There can be no controversy as to the fact that forests on high mountains frequently terminate abruptly at their upper limit, or that in certain portions of arid regions they have an equally well defined lower limit. The question is: Shall we ignore the lower boundary or give it a place in geographic nomenclature, and if admitted to be of sufficient importance to require a name, how shall it be designated?

Although the conditions which draw

a lower limit to the distribution of trees do not make their influence conspicuous over such a wide extent of territory as those which determine the similar upper boundary, yet when they are in control the line established is strongly pronounced and frequently passes through an inhabited region and is of decided economic importance. This last consideration does not apply to the line defining the upper limit of forests. Then, too, the lower limit of the forests in arid regions is also the border of treeless valleys, prairies, and deserts, and hence the most important of all the natural boundaries as expressed in the flora and fauna of arid and semi-humid countries. These statements do not seem to be open to objection, and, as may reasonably be claimed, indicate the importance of the boundary referred to and the desirability of a brief and convenient method of designating it. The boundary in question is of the same general nature as the line defining the upper limit of tree growth—that is, it is a line across which trees do not pass, and must either be designated in a corresponding manner or be given an entirely new name. Of these two alternatives the first certainly seems the more logical. By using timberline as a generic term, as many species of the "genus" can be recognized as the conditions warrant. By doing this we are not detracting from the "fixed and definite value" of the generic word, but adding to the precision with which it may be employed and enlarging its usefulness.

In criticism of the term "dry timberline," Dr Merriam states "that the lower limit of tree growth in many parts of the West is determined by temperature rather than aridity, though in some cases aridity is the controlling factor." If temperature—*i. e.*, too great a degree of heat—is sufficiently important in this connection to be frequently mentioned or discussed, it would indicate the desirability of recognizing a "hot timberline," but I do not understand that such is the case. In proposing the term "dry timberline," I sought to express in the name the prevailing and most important reason for the sharp demarcation of forests at their lower limit in arid regions. Other factors, as is well known, enter into the problem and locally assume control; such as soil texture, hot winds, fires, etc., but the prevailing and dominant condition governing the advance of forests into arid regions, to which all others must be considered as secondary, is dearth of soil moisture due to aridity of climate. In this connection it is instructive to note that *timberline*, in the narrow sense to which Dr Merriam would restrict the use of the word, is, to use his own definition, "the upper or boreal limit of tree growth as determined by temperature." Is this more exact than referring the lower limit of tree growth to aridity? There are other factors besides temperature, as observation has shown, which are effective in determining the upper limit of forests, such as the severity of winter storms (a very important and frequently controlling factor), slope of surface, degree of exposure to the sun, depth of snow, etc., each of which in certain instances locally determines the position of the boundary referred to. The most common and the dominant cause, however, to which the others are secondary or local, is a low mean annual temperature. Taking the dominant cause in each instance for the specific designation, we have the terms *dry timberline* and *cold timberline*. In a similar manner the use of the term *wet timberline* might be justified.

This discussion, however, is not really to the point, since the main objection advanced is reverence for precedent. The word timberline has been employed for a long time to designate the upper limit of tree growth on high mountains and no other similar line recognized. This custom may be said to be fixed in

popular usage, and no amount of argument will lead to a sudden change. In the writings of physiographers, foresters, naturalists, etc., however, it is but reasonable to urge that a lower as well as an upper timberline should receive attention and a consistent and logical nomenclature adopted for all similar boundaries of forests.

DECISIONS OF THE UNITED STATES BOARD ON GEOGRAPHIC NAMES

During the Period June 1 to November 20, 1903

Aberjona; river, Middlesex County, Massachusetts (not Abbajona).

Aeneas; creek, lake, mountain, and valley, Okanogan County, Washington (not Eneas).

Ahoskie; creek, post-office, railroad station, ridge, and village, Hertford County, North Carolina (not Ahoskey nor Ahosky).

Antoine; creek and valley, Okanogan County, Washington (not Antwine).

Attalla; precinct and town, Etowah County, Alabama (not Atala nor Attala).

NOTE.—This is a reversal of the decision *Atala* made in April, 1895.

Bellmont; post-office, precinct, railroad station, and village, Wabash County, Illinois (not Belmont).

Bighorn; river, in Montana and Wyoming, tributary to the Yellowstone (not Big Horn).

Blacks; fork of Green River in Sweetwater and Uinta Counties, Wyoming, and Summit County, Utah (not Black).

Blueberry; hill, in Woburn, Middlesex County, Massachusetts (not Mt Pleasant).

Bonpas; creek, Edwards, Richland, and Wabash Counties, and township, Richland County, Illinois (not Bompas nor Bonpass).

Cabezon; Indian reservation, Riverside County, California (not Cabazon, Cabazone, nor Cabezons).

Carpinteria; creek, landing, post-office, and railroad station, Santa Barbara County, California (not Carpenteria).

Carrabassett; stream, tributary to the Kennebec River, Franklin and Somerset Counties, Maine (not Carabasset, Carrabasset, nor Sevenmile).

Castile; run, tributary to south fork of Tenmile Creek, Greene County, Pennsylvania (not Casteel).

Chads Ford; post-office, railroad station, and village, Delaware County, Pennsylvania (not Chadd Ford, Chadds Ford, Chad's Ford, etc.).

Chopaka; mountain, Okanogan County, Washington (not Chapace, Chapaka, Chopace, Tcho-pahk, Tcho-park, etc.).

Chupaderas; creek, Bexar County, Texas (not Chupaderos nor Chupederas).

Croxton; run, Knox township, Jefferson County, Ohio (not Coxsons, Coxton's, Crockson, Crookston, etc.).

Cush Cushion; creek, in Greene township, Indiana County, Pennsylvania (not Cush-cushion, Cush-Cushian, nor Cushian).

Eldon; lake (arm of Raquette Lake) Hamilton County, New York (not Elizabeth nor Ellen).

Gallups; island, Boston Harbor, Massachusetts (not Gallop, Gallops, Gallup, nor Galop).

Georges; island, Boston Bay, Suffolk County, Massachusetts (not George nor St George).

Goleta; point, three miles southwest of Goleta, Santa Barbara County, California (not Pelican).

Harding; ledge, at entrance to Boston Bay, Massachusetts (not Harding's).

Hardys; pond, in Waltham, Middlesex County, Massachusetts (not Hardy, Mead, nor Means).

Hawlings; river, tributary to the Patuxent, Montgomery County, Maryland (not Hawling's nor Hollands).

Hayden; lake, in Madison town, Somerset County, Maine (not Madison [pond]).

High; hill—highest hill on Long Island—in Huntington, Suffolk County, New York (not Jayne's nor West).

Hollenbeck; river, Litchfield County, Connecticut (not Hallenback, Hallenbech, nor Hallenbeck).

Jamacho; land grant and post-office, San Diego County, California (not Jamacha).

Little Bighorn; river, in Montana and Wyoming, tributary to the Bighorn (not Little Big Horn nor Little Horn).

Little Sodus; bay, Lake Ontario, Cayuga County, New York (not Fairhaven).

Marlboro; township, Delaware County, Ohio (not Marlborough).

Myers; creek, Okanogan County, Washington, and British Columbia (not Meyers nor Myer).

Myers Creek; mining district and precinct, Okanogan County, Washington (not Meyers Creek).

New Kingstown; post-office, railroad station, and village, Cumberland County, Pennsylvania (not New Kingston).

Nissequogue; neck and river, Smithtown, Suffolk County, New York (not Nessequoque, Nissaquague, Nissaquog, etc.).

Nixes Mate; shoal, in Boston Bay, Suffolk County, Massachusetts (not Nicks Mate, Nix Mate, Nix's Mate, nor Nixs Mate).

Orowoc; cove and creek, Islip, Suffolk County, New York (not Oriwic, Oriwoc, nor Tern's).

Pakatakan; mountain, Delaware County, New York (not Pakataghkan).

Peddocks; island, in Boston Bay, Plymouth County, Massachusetts (not Peddock, Pethick's, Pettick's, nor Puttock).

Pines; river, forming boundary between Essex and Suffolk Counties, Massachusetts (not Bear nor Chelsea).

Salitrillo; creek, Bexar County, Texas (not Salatrillo).

San Dieguito; river formed by the junction of Santa Maria and Santa Ysabel Creeks, San Diego County, California (not Bernardo, San Bernardo, nor San Pasqual).

Santa Ysabel; creek or river, uniting with the Santa Maria to form the San Dieguito, San Diego County, California (not San Pasqual nor San Ysabell).

Segloch; run, Lancaster and Lebanon Counties, Pennsylvania (not Seclock, Seelock, Zeloch, etc.).

Sequan; Indian reservation and mountain peak, San Diego County, California (not Cycuan, Sycuan, nor Syenan).

Tasnuna; river, tributary to Copper River from the west, opposite Bremner River Alaska (not Tasnu).

Tinkers; island, southeast of Marblehead Neck, Essex County, Massachusetts (not Tinker nor Tinker's).

Toats Coulee; precinct, Okanogan County, Washington, and stream, tributary to the Similkameen near longitude 119° 45′ (not Toad Coulee, Toads Coula, Toats Coula, etc.).

Toro; Indian reservation, Riverside County, California (not Toros, Torres, nor Torros).

Tonasket; creek and post-office, Okanogan County, Washington (not Tenasket, Tonaskot, nor Dry Gulch)

Toroda; creek, in Ferry and Okanogan Counties, and mountain, Okanogan County, Washington (not Tarota, Tarroda, nor Teroda).

NOTE.—This is a reversal of the decision *Teroda*, made March 12, 1902, for the creek and mountain.

Toroda Creek; precinct, Okanogan County, Washington (not Teroda Creek, etc.).

Tunk; creek and mountain, Okanogan County, Washington (not Tonk).

Weir; river (channel), Boston Bay, Plymouth County, Massachusetts (not Weare).

Wills; creek, Jefferson County, Ohio (not Will, Willis, nor Will's).

Yahara; river, in Dane and Rock Counties, Wisconsin (not Catfish nor Gahara).

STATISTICAL ATLAS OF THE UNITED STATES

THE Census Office has just issued the Statistical Atlas of the United States for the last census. It is a magnificent volume, 10 by 12 inches, containing 207 plates and hundreds of maps and diagrams, which show the complete results of the census in graphic and convenient form. The majority of the maps, charts, and diagrams are in colors, often as many as five and six colors being used on one map.

The atlas is divided into four parts: Population; Vital Statistics; Agriculture; Manufactures. The series of charts on each of these subjects is preceded by a chapter of explanation. The work was prepared under the supervision of Mr Henry Gannett, Geographer of the Twelfth Census.

The atlas is a unique publication. No other government in the world issues any similar work comparable to it. The Census Office deserves great credit for the promptness with which the atlas has been prepared and published. It may be obtained of the "Superintendent of Public Documents, Washington, D. C.," for $4.00.

The famous Waldseemuller map of 1507, the earliest one in existence bearing the name of America, was exhibited for the first time in America December 18 in an address to the National Geographic Society by Prof. E. L. Stevenson, of Rutgers College. This map was recently discovered in Germany * by Joseph Fischer and antedates by a number of years any other map containing the word America. Fischer found it in the archives of one of the ducal castles of Prussia. The map is nine feet long. It is believed that Waldseemüller printed 1,000 copies of this map in 1507, but as it was a wall map, all of the copies have perished except this one.

*See NATIONAL GEOGRAPHIC MAGAZINE, February, 1902, page 72.

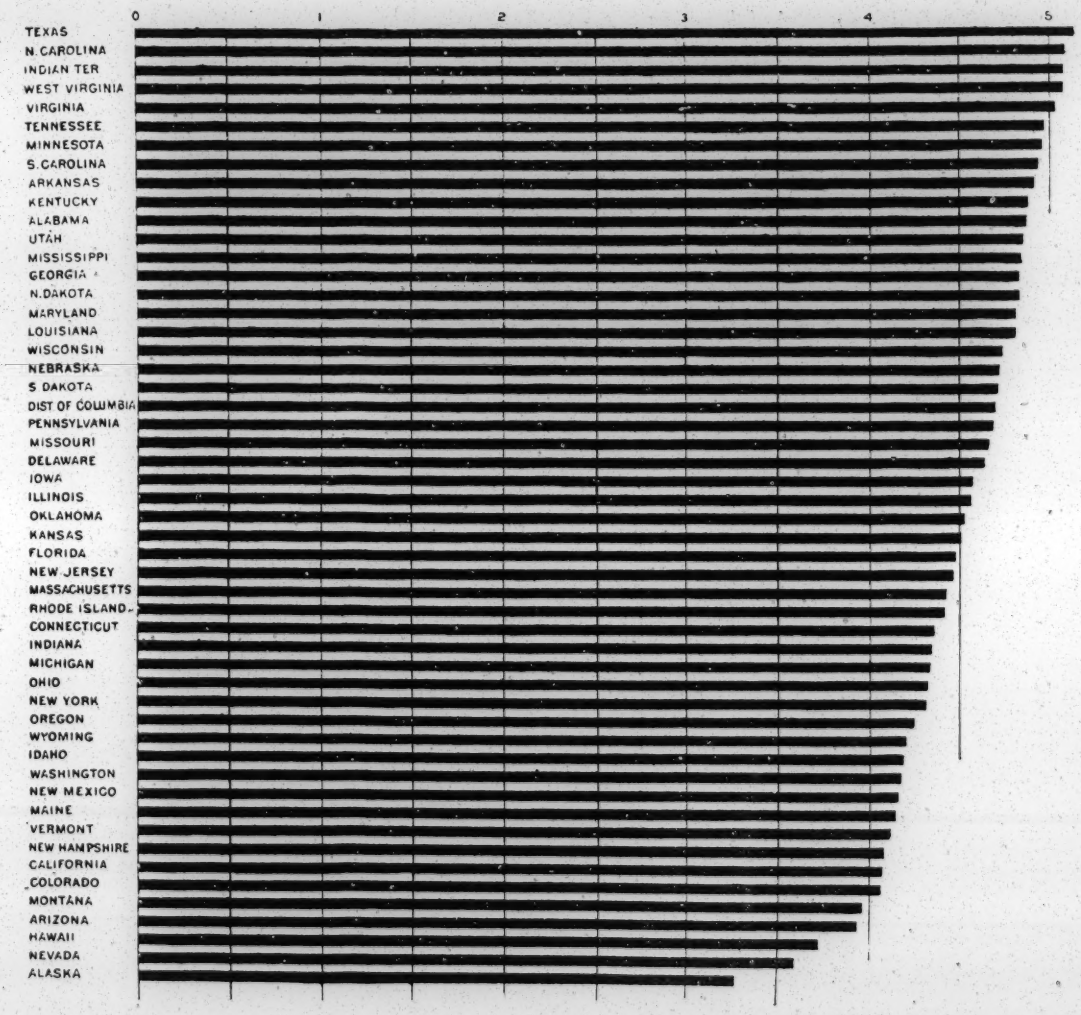


Diagram Showing the Average Number of Persons to a Private Family in each State and Territory of the United States in 1900: Gannett's Statistical Atlas of the United States

It is interesting to note that nearly all the southern states lead in the size of their private families, while the six New England states, and New York, California, and Washington bring up the rear.

The later Waldseemüller map of 1516, on which the name America does not appear, as the author had learned by that time that he had unjustly given Amerigo Vespucius credit for discovering the new world, was exhibited for the first time in America by Professor Stevenson at the same time.

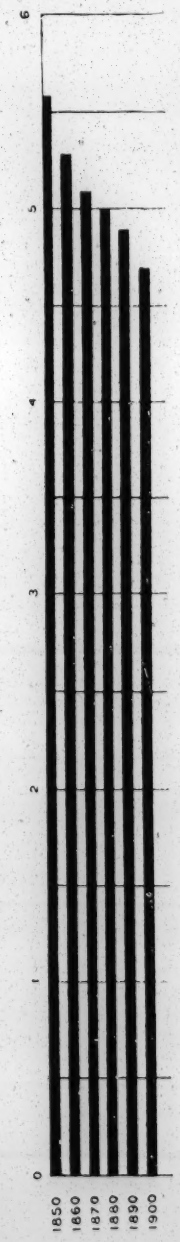


Diagram Showing the Average Number of Persons to a Family in the United States—1850 to 1900.

The census figures show that the number of persons in the average American family is nearly one less than it was 50 years ago—4.7 in 1900 as against 5.6 in 1850.

GEOGRAPHIC LITERATURE

Around the Caribbean and Across Panama. By Francis C. Nicholas, Ph. D. Illustrated. Pp. 373. 6 by 8 inches. Boston: H. M. Caldwell Co. 1903. $2.00.

This timely book describes in interesting manner the incidents and adventures of the author in the various countries bordering the Caribbean sea. As the commercial explorer of large moneyed interests, Mr Nicholas has transversed Colombia, Venezuela, Panama, Central America, and the many islands of the West Indies. He dwells repeatedly on the great untouched wealth and possibilities of these countries, which, he asserts, far surpass even common report. At present, however, American capital investing in these regions takes great risks of losing everything, owing to political uncertainties.

Mr Nicholas' experiences on his journeys to Bogota were extremely disagreeable.

"On the road across the mountains there were no exciting incidents, only annoyances; the way was tedious, the people inhospitable, the road-houses unclean, and their charges little short of robbery.

"Bogota is on the eastern side of a great interior savannah, an open grass plain at almost ten thousand feet elevation above the sea, a place of enchanting beauty, a broad expanse of open country surrounded by the bleak summits of inner ranges of the Andes Mountains.

"But the city is a place of vermin and corrupting filth; a place where the common incidents of the streets are not fit to be described; where beggars, displaying revolting sores and rotting limbs, swarm about, even thrusting their filthy bodies where they may touch those who pass by, while they demand, not solicit, alms; where ill-mannered, arrogant, overdressed people make vulgar display of their clothes as they strut about and crowd for precedence, making much of the antiquated custom of demanding a

place next the wall—a fad which caused continued misunderstanding, because all claimed the wall and it was difficult to pass. For my part, I walked mostly in the streets and left the sidewalks to the natives.

"In Bogota one can see the Sedan chairs in active use, similar to those which are read about in historic accounts of periods some two or three centuries gone past. Here ladies, to show their piety and religious sentiment, go about dressed as penitents in rough garment and belt of rope, but the dress is drawn tightly about them, that they may not touch the swarms of filthy people."

The volume is handsomely illustrated from photographs and with maps, and is an exceedingly desirable book.

Elementary Geography. By Charles F. King, Master of the Dearborn School, Boston. Profusely illustrated. Pp. vi + 220. 9 by 10½ inches. Boston: Lothrop Publishing Co. 1903. $0.65.

In plan and in treatment, and especially in illustrations, this elementary geography is a great advance over previous textbooks. It will create a new era in the teaching of geography to young children. The numerous graphic illustrations must appeal to the quick fancies of young people, while the simple, unpretentious language will hold their attention. The author has constantly remembered the words of Herbert Spencer that "a child's restless observation, instead of being ignored or checked, should be diligently administered to and made as accurate and complete as possible;" and he has also kept in mind the fact that the power of observation comes to children first and the power of reasoning later. As a result, his book will stimulate the questioning faculty which all young people have in such marked degree, instead of confusing and checking their ideas with elaborate explanations which they are unable to grasp.

A Mother Kangaroo, with a Young Kangaroo in her Pocket

From King's "Elementary Geography." Copyright, 1903, by Lothrop Publishing Co.

The book is divided into four parts: Home Geography by Observation, Geography through Type Forms, The Earth as a Whole, and Journey Journey. All descriptions and explanations are given

From Brownell's "The Heart of Japan." Copyright, 1903, by McClure, Phillips & Co.

as a story to the children. Photographs are exclusively used as a basis for the pictures of wild animals. Useful suggestions are given at the end of each chapter. The author is to be especially congratulated on his choice of illustrations. Each picture has some striking fact so vividly presented that the lesson is not forgotten. Some very handsome colored plates are given in the book. The publishers have done their part as well as the author. The work is handsomely printed, the type large, and the pictures clear and elegantly engraved.

The Heart of Japan. By H. L. Brownell. Illustrated. Pp. 309. 5 by 7½ inches. New York: McClure, Phillips & Co. 1903. $1.50 *net.*

Mr Brownell was for many years a teacher of English in the public schools of Japan. Most of the time he was stationed in towns away from the railways, where he lived with country people—the true Japanese, as he calls them. Many books have been written about the Japanese during the last few years, but the present one is distinct and fresh and gives a charming and entirely different account of the lives of this bright and fascinating people. The reader sometimes wonders whether Mr Brownell is not emulating Munchausen, but all his stories are so well told that we must believe him.

The opening chapter describes an enterprising farmer who dug a deep well on his fields, and then put in an American pump, consecrated it to a god, and then allowed all worshipers at this shrine free baths. The water which the many devotees zealously pumped meanwhile by a hidden conduit was led out to irrigate his fields, and kept them green and prosperous when all other fields were parched and ruined.

Chapter V, "The Honorable Bath," describes another phase of Japanese country life. Every chapter in the book is almost equally well done, though, perhaps, the most interesting is "Diving Belles." This is an account of a peculiar seacoast village, where the women so outclass the men in diving for pearls that the men stay at home and keep house and do the cooking, etc., while their wives are swimming and diving for hours in the sea.

BOOKS RECEIVED FOR REVIEW

The Moon. By Wm. H. Pickering. With 100 full-page plates. Pp. xii + 108. 11 by 12 inches. New York: Doubleday, Page & Co. 1903. $10.00 *net.*

New Conceptions in Science. By Carl Snyder. Illustrated. Pp. 361. 5½ by 8 inches. New York: Harper & Brothers. 1903. $2.00 *net.*

Climbs and Explorations in the Canadian Rockies. By H. E. N. Stutfield and J. Norman Collie, F. R. S. Illustrated. Pp. 343. 6 by 9 inches. London: Longmans, Green & Co. 1903. $4.00 *net.*

A Handbook of Modern Japan. By Ernest W. Clement. Illustrated. Pp. 395. 5 by 7½ inches. Chicago: A. C. McClurg & Co. 1903. $1.50.

The Forest. By Stewart Edward White. Illustrated. Pp. 276. 6 by 9 inches. New York: The Outlook Company. 1903. $1.50 *net.*

Handbook of Commercial Geography. By Geo. G. Chisholm. (Fourth corrected edition.) Illustrated. Pp. xlvi + 639. 6 by 9 inches. New York and London: Longmans, Green & Co. 1903. $4.00.

Present Day Egypt. By Frederic Courtland Penfield. Illustrated. Pp. 396. 5½ by 8 inches. New York: The Century Co. 1903. $2.00.

The Russian Advance. By Albert J. Beveridge. Illustrated with maps. 6 by 8½ inches. New York: Harper Brothers. 1903. $2.50 *net.*

Indians of the Painted Desert Region. By George Wharton James. Illustrated. Pp. 268. 6 by 8½ inches. Boston: Little, Brown & Co. 1903. $2.00 *net*.

Indians of the Southwest. By George A. Dorsey, Ph. D. Illustrated. Pp. 222. 5½ by 7½ inches. Chicago: Passenger Department, Atchison, Topeka and Santa Fé Railway. 1903. $0.50.

Round Kangchenjunga. A narrative of mountain travel and exploration. By Douglas W. Freshfield. With illustrations and maps. Pp. xvi + 373. 6½ by 10 inches. London: Edward Arnold. New York: Longmans, Green & Co. 1903. $6.00 *net*.

Irrigation in India. (Second edition.) By H. M. Wilson. Illustrated. Pp. 238. 6 by 9 inches. Washington: Geological Survey. 1903.

NATIONAL GEOGRAPHIC SOCIETY

In view of the present widespread interest in the Republic of Panama and of the paramount importance to this country of the Panama Canal, the Lecture Committee have altered the program previously announced and have made arrangements for two addresses on the Panama question.

The first of these will be by Hon. Wm. H. Burr, member of the Isthmian Canal Commission and Professor of Engineering in Columbia University, and will be given on Friday evening, January 15.

The second address will be given on Saturday evening, January 30. The name of the speaker will be announced later.

The committee have also changed the subject of the afternoon course of lectures during February and March from that previously announced, "The Growth of Diplomacy," and announce instead a course of five addresses on "The Countries of South America."

The completed program for the remainder of the season is as follows:

REGULAR MEETINGS OF THE SOCIETY

The annual meeting will be held in the large hall of Columbian University, and succeeding meetings at the Cosmos Club until Hubbard Memorial Hall is completed (about February 1).

January 8, 1904.—Annual meeting, followed by an address by Prof. Wm. M. Davis, of Harvard University, on "A Summer in Turkestan."

January 22.—"The Work of the Bureau of Insular Affairs." Col. Clarence R. Edwards.

February 5.—"The Work of the Bureau of Statistics." Hon. O. P. Austin.

February 12.—"The Work of the Bureau of Fisheries." Dr Barton W. Evermann.

March 4.—"The Work of the National Bureau of Standards." Dr G. M. Stratton.

March 18.—"The Work of the U. S. Biological Survey." Dr C. Hart Merriam.

POPULAR COURSE

National Rifles' Armory, 920 G street, at 8 p. m.

Friday, January 15.—"The Republic of Panama." Hon. Wm. H. Burr, of the Isthmian Canal Commission.

Saturday, January 30.—"Panama and the Panama Canal."

Saturday, February 20.—"Joys of the Trail." Mr Hamlin Garland, author and lecturer.

Friday, February 26.—"Travels in Arabia and Along the Persian Gulf." Mr David G. Fairchild, Agricultural Explorer of the Department of Agriculture.

Friday, March 11.—"Little Known Peoples of Mexico." Dr Carl Lumholtz, author of "Unknown Mexico," etc.

Friday, March 25—"The Louisiana Purchase Exposition." President David R. Francis.

Friday, April 11.—"The Ancient People of Bolivia." Mr Adolph F. Bandelier, American Museum of Natural History.

AFTERNOON COURSE OF LECTURES

In the large hall of Columbian University.

General subject: The Countries of South America.

February 27.—Colombia and Venezuela. Hon. F. B. Loomis, Assistant Secretary of State.

March 5.—Peru. His Excellency Manuel Alvarez Calderon, E. E. and M. P. from Peru.

March 12.—Brazil. Hon. Robert Adams, Jr., M. C., formerly Minister to Brazil.

March 19.—Argentine Republic.

March 26.—Chile. Mr Charles M. Pepper.

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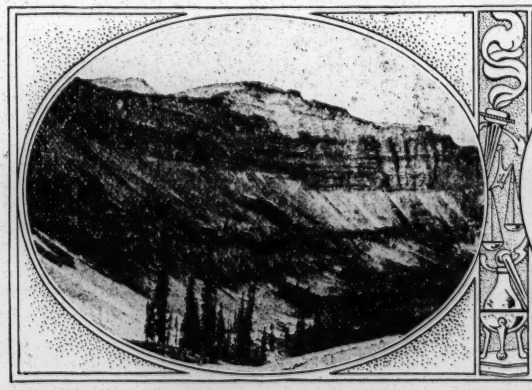

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